

THE
OPERATIONS
IN
SURGERY
OF

MONS. LE DRAN.

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The ELEVENTH EDITION of

The Anatomy of the Human Body.

By W. CHESELDEN,

Surgeon to his Majesty's Royal Hospital at *Chelsea*
F. R. S. and Member of the Royal Academy
of Surgeons at *Paris*.

Illustrated with Forty COPPER PLATES.

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T. CADELL, R. BALDWIN, and T. LOWNDES.

THE
OPERATIONS
IN
SURGERY

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Senior Surgeon of the Hospital of *La Charité*,
Consultant Surgeon to the Army,

Member of the Academy of Surgery at PARIS, and
Fellow of the Royal Society at LONDON.

TRANSLATED
By Mr. G A T A K E R, Surgeon.

W I T H
Remarks, Plates of the Operations,

A N D
A Sett of INSTRUMENTS,
By Mr. CHESELDEN,

Surgeon to the Royal Hospital at CHELSEA, and Member
of the Academy of Surgery at PARIS.

Manu strenua, stabili, nec unquam intremiscente. Celsus.

THE FIFTH EDITION.

L O N D O N:
Printed for J. DODSLEY and B. LAW.

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THE
OPERATIONS
OF
SURGERY
BY
J. L. DRAKE

Second Edition, as the Hospital of La Charité,
Constantinople, and the Academy of Medicine, Paris, and
Fellow of the Royal Society, London.

By J. L. DRAKE, Surgeon.

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Remains, Place, Operations,

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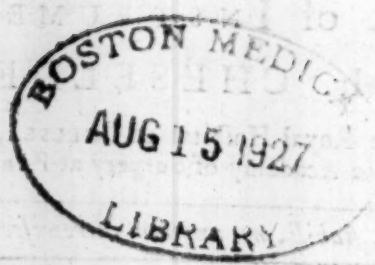
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P R E F A C E:

THE practice of Surgery in *England* has of late years received such great improvements, that to offer the public the sentiments of a foreign writer upon this subject, may seem perhaps at present unnecessary. This Consideration at least would in general have suppressed any such intention in me; but the great commendations which have been given to the following treatise in the original, will, I imagine, recommend a translation of it. In the execution of this undertaking, I have endeavoured chiefly to be exact and faithful to the original, not only in justice to the author, but in respect to any connection which particular parts might have with
Mr.

P R E F A C E.

Mr. *Chefelden's* notes. I shall trouble the reader no farther than to acquaint him that the references which *Monf. Le Dran* has made to his *Book of Observations*, I have applied to the translation of that Work.



C O N-

CONTENTS.

T HE Introduction	Page 1
Of an Inflammation	9
Of Sutures	27
Of Wounds in the Abdomen	47
Of Hernia	66
Of Dropsies	112
Of the Diseases of the Testicles	142
Of the Phimosis	149
Of the Paraphimosis	152
Of the Amputation of the Penis	155
Of the Fistula in Ano	158
Of the Hæmorrhoids	173
Of the Stone	185
Of the Fistula in Perinæo	270
Of the Cancer	287
Of Disorders of the Breast requiring an Ope- ration	306
Of the Quinzy	323
Of the Hare-lip and the twisted Suture	339
Of	

CONTENTS.

	Page
<i>Of the Polypus</i>	346
<i>Of the Fistula lacrymalis</i>	356
<i>Of Wounds of the Head</i>	368
<i>Of Aneurisms</i>	398
<i>Of the Panaris or Whitloe</i>	412
<i>Of Amputations</i>	422
<i>Observations by Mr. Cheselden</i>	445
<i>An Essay towards a new Pharmacopœia Chirurgica</i>	465



A TREA-



[1]

A
T R E A T I S E
O F T H E
O P E R A T I O N S
I N
S U R G E R Y.

I N T R O D U C T I O N.

AN OPERATION in surgery is a methodical application of the hand or instruments upon the human body, either to preserve or restore health, or to palliate such disorders as are incurable.

To answer these intentions there are four general methods employed in surgery, which are distinguished by the following names, viz. *Synthesis*, *Diæresis*, *Exæresis*, and *Prothësis*, and the indication of their several uses is derived from a just knowledge of diseases. The reason that has induced authors to continue these Greek terms, seems

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2 INTRODUCTION.

to be well founded, as they not only characterise each operation in particular, but denote the various purposes they may be applied to in different diseases.

It might not be improper in this place to observe the remarkable difference between the ancient and modern practitioners in the performance of these four operations, which were known to the ancients, and are described in their writings under the preceding denominations; but this would carry me beyond my design. The ancients only laid the foundation, which was doing considerable service: They who have come after them have worked upon their plan, and from time to time the art of surgery has received improvements; but the last age particularly has so enriched it with new discoveries, as renders it not at all surprising, that we, who have brought the art to a still greater perfection, should in many things differ from them both in the manner of operating and the treatment in general.

To avoid confusion, I shall omit in the theoretical part many of those divisions and subdivisions, with which authors abound, as being of no use towards promoting practical knowledge in beginners, but tending rather to confound than improve them. For the same reason I shall suppress many of their Greek terms, reserving such only as are in general use.

As to the manner of performing operations, I shall not particularly examine into every method that has formerly been made use of, and which some of the moderns perhaps may still retain; but shall content myself with describing that which I conceive most eligible, and giving such reasons for it as are founded upon experience.

INTRODUCTION. 3

Of the Syntbesis.

SYNTHESIS is an operation of surgery by which those parts that are divided are brought together, and retained in that situation.

It is employed both on the hard and soft parts: upon the hard parts on two occasions, namely, in luxations and fractures. Thus we have recourse to the *Syntbesis* in the reduction of dislocated bones, or when we bring together the pieces of a fractured bone.

It is used also to the soft parts upon two occasions. In the first, where we re-place with the hand, without the use of instruments, the parts that have quitted their natural situation, as in the reduction of an intestine or the epiploon, when they are fallen out of the abdomen and form a *Hernia*. This kind of *Syntbesis*, authors have named *Taxis*. In the second we facilitate the re-union of the soft parts that have been divided, which is done either by making a new division, as by a suture with a needle; or without making a new division, as when we bring together the lips of a wound and keep them so by a dry suture, or a proper bandage.

THE success of these operations depends greatly upon a right application of bandages, compresses, splints, &c. and upon putting the parts affected in a proper position.

Of the Diæresis.

DIÆRESIS is performed by dividing those parts that are naturally united, and is equally employed upon the soft and hard parts; but as it may be undertaken by different methods, we shall divide

4 INTRODUCTION.

them into three kinds, namely, cutting, lacerating, and burning. All the kinds of cutting which can be made in the soft parts may be reduced under the general term of incision, as they may be almost all performed with the knife. The case is different in the hard parts, where the same instrument will not always serve the purpose. Sometimes we perforate the bone, as with a crown saw, called a trepan; sometimes we saw it with a strait saw; upon other occasions we scrape it with a rugine, sometimes we use a file, and at other times cut it with the incisive pincers, or a gouge, which is a kind of chezil. We may distinguish therefore the incisions made use of to the hard parts into four kinds; namely, sawing, scraping, filing, and cutting.

LACERATION, the second sort of *Diæresis*, is used also to the soft and hard parts. In extracting the polypus we lacerate: and the same thing is done in the extirpation of schirrous glands, and in many other operations, when, having divided the teguments with a bistory, we break the membranous bridges in the wound with our fingers. Lacerating of the hard parts is only used in drawing the teeth.

BURNING, a third manner of performing the *Diæresis*, may be used both to the hard and soft parts, or with the actual or potential caustics. As to the soft parts, burning them with the actual cautery, which was very customary among the ancients, has too much the appearance of cruelty, and therefore now very seldom made use of; but we frequently have recourse to it, and with great success, in a deep *caries* of the bones, in order to promote their exfoliation.

I SHALL pass over the puncture, which has been admitted by authors as another species of *Diæresis*,
since

INTRODUCTION. 5

since by the word puncture we ought only to understand a separation of the fibres from each other without a division of them; whereas in the different kinds of punctures which they treat of, and which are made by the lancet, leeches, or the trocar, there must necessarily be a division and even an incision, whence a bleeding of the part ensues. It is not therefore a puncture, but a very small division.

Of the Exarefis.

THE *Exarefis* consists in removing extraneous substances out of the body that are prejudicial to it; and this is performed differently according to the different ways in which these substances were received; that is, either by making a fresh wound, or not: if without making a fresh wound, it is done by removing the extraneous body at the natural opening where it entered, or by the opening which it made at its entrance. The other method is by making a wound to procure it an easy passage, in case there is not one already, as in lithotomy; or by enlarging the wound, if it is too small; or else by a counter-opening, made to perform the extraction more conveniently and with less danger.

Of the Prothefis.

THIS, which is described as the fourth surgical operation, consists only in putting on, and adapting an artificial member where the natural one is wanting, and is done for several purposes; as a glass eye is designed for ornament, a wooden leg or arm for use; and sometimes necessity requires it, as in the application of an artificial palate.

6 INTRODUCTION.

Necessary and useful considerations.

As these operations are intended to promote the health of our fellow-creatures, they require, upon that account, the strictest attention in those that perform them.

THE first thing that requires the surgeon's consideration, is to endeavour to gain a thorough knowledge of the disease entrusted to his care, in order to take a proper method for the patient's relief. If the disease cannot be removed but by an operation, he ought to consider at the same time, whether in consequence of such an operation a worse disease may not ensue. For instance, how often have people that were troubled with the piles (which nature had chosen as a useful drain to the constitution), after being cured by an operation, been subject to some other more dangerous disease?

He ought in the next place to consider the age of his patient, his strength, and the state of his mind; and to judge from thence whether he is capable of supporting the fear, pain, and danger of the operation. Fear, we know, has a great effect upon the constitution, and we have seen instances of patients, who, immediately upon knowing there were no other means of cure than by an operation, have fallen into the most unhappy condition. Pain, as is evident by examining the circulation with a microscope, occasions such spasmodic motions upon the fibres as check the blood in its circulation, and sometimes oblige it to return in the vessels; thereby altering or suspending the course of the fluids, even in the capillaries. Hence probably may arise the inflammations which frequently appear after an operation. And it is from a due consideration of all these circumstances,

I N T R O D U C T I O N. 7

stances, that a surgeon is to form a just diagnostic to direct him in the management of the disorder, and to undertake a radical or palliative cure, as may best contribute to the good of the patient, the credit of surgery, and his own reputation.

If the operation is judged necessary and practicable, the next consideration is to chuse, as far as circumstances will admit, the most suitable time to undertake it. There are some operations for which we may, and indeed ought to, wait a favourable season; but there are others which will not admit of being deferred, and by delay would become more dangerous. In the last case, care must be taken to correct the air in the patient's chamber according as the degree of heat or cold requires.

THE time being fixed for the operation, there are still three circumstances to be attended to, namely, what ought to be done before, at, and after the operation. Before the operator begins, he should consider the natural structure of the part, the state of the disease, and the alterations it may have occasioned in the constitution; in short, he should first perform the operation in his imagination, and foresee the accidents that may arise: by being thus apprised, he will be better able either to avoid or to remedy them more effectually if they should happen.

He ought to furnish himself with good instruments, and to have a duplicate of each, in case one should be spoiled.

He should provide himself likewise with stypticks and other astringents, and several needles ready threaded, to make a ligature, if necessary, upon the vessels.

If he performs the operation by candle-light, he should have several lighted, lest that which he uses should accidentally be put out.

8 INTRODUCTION.

THE proper dressings for the wound should also be prepared.

IMMEDIATELY before he begins the operation, he is to place the patient and the assistants in a proper situation, having first given instructions to the latter, what each of them are to do, who by this means will understand, upon the least hint, what the operator intends, and will execute their parts better and more readily. As to the patient, he should be placed in as easy a situation as possible, that he may continue in it 'till the operation is over.

EVERY thing being thus got ready, the surgeon begins the operation: which should be done *expeditiously*, and *effectually*; *expeditiously*, because every moment of suffering appears long; nevertheless, the operator must allow himself sufficient time; and when I used the word *expeditiously*, I only meant that he should not lose time, taking great care not to be over hasty, lest his hand out-run his judgment, which should direct it: an operation is always soon enough done that is well done. He is likewise to operate *effectually*, that is, in such a manner as not to be obliged to renew the operation, or to make fresh incisions. If the case requires that the operation should be done at twice, or if he plainly foresees there will be imposthumations and sinuses which must be afterwards opened, he ought to mention this beforehand, to prevent the patient being alarmed when it happens, as well as to preserve his own character. In performing the whole, he should endeavour to give as little pain as possible, and not to incur the imputation of cruelty.

The operation being over, he is to dress the wound, and put the patient in such a situation as may be easy, and likewise convenient for his disorder.

He

INTRODUCTION. 9

He is afterwards to correct the present symptoms, and prevent, as much as possible, those that may supervene.

As the success of all our operations depends much upon the assistance of nature, and as the inflammation which may ensue is one of the most common symptoms, and also the most capable of frustrating our design, I think it proper to begin with the article on that head; to lay down such methods as may prevent it as much as possible; to give an account of its rise and progress, its different terminations, and the means that may be used for relief.

Of an INFLAMMATION.

THE several parts of the body are composed of nerves and vessels which either convey the fluids from the centre to the circumference, or bring them back from the circumference to the centre. By the centre is meant the left ventricle of the heart, from whence the circulating fluids take their rise, and to which they are again returned. By the circumference we understand every part from whence any vessel arises that re-conveys to the heart the remainder of the fluids, after they have performed the offices of nutrition and secretion; and as such re-conveying vessels arise from almost every part of the body, so the whole may be considered as the circumference.

THESE vessels are divided into arteries and veins: The arteries are of two kinds; first, those which are called sanguinary arteries, arising from the heart by a great trunk termed aorta, which afterwards subdividing into innumerable branches, distribute

10 OF AN INFLAMMATION.

distribute the arterial blood to the several parts. Secondly, the lymphatic arteries, which take their rise from the former, at different distances, and convey to the parts a limpid fluid separated from the arterial blood. The vessels that re-convey these fluids are likewise of two kinds; the sanguinary veins, which return the greatest part of that blood, which the sanguinary arteries conveyed to the circumference; and the lymphatic veins, which re-convey the remaining lymph brought thither by the lymphatic arteries. As the good state of these fluids is necessary for the attainment of health, and preservation of life; so the due distribution of them, and the just structure of the vessels wherein they circulate, is equally requisite; and either to a division or an obstruction of these vessels most Chirurgical disorders are owing.

If the fluids are too violently propelled into any of the capillaries, it is possible that some of the floating particles, being too large for the diameters of those vessels, may stop, and cause an obstruction; and, unless there are some collateral tubes capable of conveying them on in the course of the circulation, they must necessarily be more strongly fixed, and the obstruction thereby become more confirmed. It is this obstruction which we consider as the cause of an inflammation, in whatever vessel it happens, whether sanguinary or lymphatic. From this time the tumor commences, tho' it may not yet be apparent; but, in proportion as the obstructions extend to the neighbouring parts, the tumor increases.

AMONGST the different parts of our bodies, some have a larger share of sanguinary, others of lymphatic vessels, and this may be distinguished by the different colour which is predominant in each part. If the obstruction be in the lymphatics
only,

OF AN INFLAMMATION. 11

only, we may term this inflammation an erysipelas ; if in the sanguinary vessels, a phlegmon ; but as throughout the whole body there is always a congeries of sanguinary and lymphatic vessels, so we rarely find a tumor simply erysipelatous or phlegmonous, tho' we every day, in practice, make use of the words phlegmon and erysipelas. All the distinction we can make then is, when the inflammation is chiefly situated in the sanguinary vessels, and affects the adipous parts, to call it an erysipelatous phlegmon ; when it attacks the membranous parts, to term it a phlegmonous erysipelas.

WHATEVER is capable of giving an increased velocity to the blood, or can thicken or coagulate it, may produce these obstructions ; whether by introducing into it any heterogeneous matter, as ill-digested aliments, or any poisonous substance, or by incrassating the fluids by profuse sweats, or a too large discharge of urine, &c. They may also arise from an external irritation by puncture, excoriation, or incision ; likewise from any long compression, violent contusion, or extension, which destroy the elasticity of the vessels that assist the progressive motion of the blood.

FROM an obstruction proceeds a stagnation ; that is, the fluids intirely lose their progressive motion ; first in some of the tumified vessels, and afterwards in others where they circulated but slowly. These stoppages, and the alterations they may occasion in the obstructed fluids, happen sooner or later, according to the degree of their velocity or their disposition to fermentation ; and hence has arisen the distinction which authors have made, of tumors formed either by fluxion or congestion ; though it is certain they are all formed according to the same laws, and these expressions only signify the *modus agendi*.

FROM

12 OF AN INFLAMMATION.

From whatever cause these disorders arise, they always terminate either by a resolution of the obstructed fluid, an induration of the tumor, by suppuration, or a gangrene.

Termination by Resolution.

RESOLUTION is a motion in the obstructed fluids, which causes part to transpire through the pores, and the rest to enter again into the course of the circulation.

Two things are necessary to procure this resolution.

THE first is, to abate the visus of the solids, and lessen the weight and quantity of the blood; as these tend rather to increase the inflammation than remove it: In this view bleeding is necessary, either evacuative, revulsive, or derivative, as the strength of the patient will admit, and the circumstances of the case require. The second is, to have a regard to the disposition of the fluids; for which purpose such a diluting regimen ought to be prescribed as may retard the progressive motion of the blood, allay its effervescence, and conduce to its fluidity and attenuation. If the tumor is in neither of the great cavities, but situated within the reach of external applications, we should assist nature by applying emollient cataplasms in order to relax the fibres of the obstructed vessels, and thereby prevent their laceration, by making them yield to extension; to which should be added resolvers, to attenuate the obstructed fluids before they become putrid, causing part of them to transpire through the pores, and the remainder to pursue its course in the circulation.

WHEN the resolution is made, the tumor diminishes,

OF AN INFLAMMATION. 13

minishes, the pain and fever abate, and the applications are less apt to dry upon the part. But if, in opposition to our endeavours, the inflammation still increases, it will terminate either by suppuration, a schirrus, or gangrene, according to the disposition of the stagnated fluids; and in that case, if the disorder be external, suppuration should be promoted to prevent its terminating in a schirrus or gangrene, which are both to be avoided; but if the tumor is situated in any of the great cavities, out of our reach, we must leave it to nature to determine the event.

Termination by Schirrus.

THE obstructed fluids are not always disposed either to be resolved, or changed by fermentation, into *pus*; but, notwithstanding the application of the most efficacious topics, they will sometimes be so inspissated in the vessels, that the tumor remains hard and almost indolent. This happens chiefly in the glandular parts, agreeable to the nature of their fluids: and the only way to prevent this accident is by the use of diluting medicines of the spirituous kind, and emollient topics of a moderate warmth. Unctuous and emplastick substances stop the pores, and such as are very hot thicken these fluids, which are not of a nature to admit fermentation.

THOUGH the tumor, thus terminating, does not seem at present to prejudice the parts affected, yet in time it may produce ill consequences by its pressure upon the neighbouring vessels, and thereby impeding the free course of the circulation. An account of such a schirrus in the epiploon may be seen in my *Observations*, p. 223.

IF

14 OF AN INFLAMMATION.

If a tumor of this kind be situated externally, we may hope, by the use of baths, pumping on the part affected, and such like remedies, to attenuate the fluids gradually, and so to excite their principles to motion, that they may either resolve themselves, or come to suppuration; in either of which cases the distemper will be removed.

Termination by Suppuration.

It is seldom that the obstructed fluids remain intirely inactive, but are often put into motion by a kind of fermentation which dissolves them: By this means their bulk is increased, and the vessels being very much distended, become thin, break, are attenuated, as it were, by attrition, and mixed with the putrifying fluids: so that altogether they are formed into a substance, which we call *pus*. When the tumor is thus disposed to suppuration, we should promote the formation of matter by applications that will soften the teguments, advance the fermentation and maturation of the collected fluids, and confine the heat and the perspiration; such as warm oils, the gum plasters, cataplasms with lily roots, &c.

THE symptoms that attend the formation of *pus*, are pain, heat, tension, a pulsation and fever: Pain is an inseparable concomitant, as the two only causes that can produce it, are here united; namely, a forcible extension, and a solution of continuity; and according to the different degrees of these, the pain is more or less acute. The fermentation cannot be carried on without a proportionable warmth or heat: The pulsation arises from the increased action of the heart and arteries, in order to continue the circulation; to which may
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OF AN INFLAMMATION. 15

be added, that parts in a state of tension are most sensible of their vibrations. Lastly, where the course of the fermenting fluids is retarded, it is almost impossible but some part of them must be separated and return into the circulation; and this produces a fever, which, from the same cause, increases till the maturation is completed. When the matter is formed, we find the bulk of the tumor apparently augmented, the redness of the part abated, and by pressing with a finger on each side the tumor, you may feel a fluctuation of the matter: Sometimes the cuticle separates, as it does in a gangrene.

THE proper time of opening abscesses or imposthumes in general, is, when the *pus* is formed, and discoverable by the fluctuation of it; nevertheless there are some exceptions to this rule. Some of these tumors should be opened before the maturation is completed; such as critical abscesses, which sometimes terminate malignant fevers. But in those, which, according to the expression of the ancients, are made by congestion, the fermentation of the obstructed fluids being very slow, there usually remain indurations, which may be felt about the circumference of the fluctuation, and are not easily reduced into *pus*. These ought not to be opened too hastily, for the matter, by being confined, more easily wastes them, than any digestives that can be afterwards applied. If they are opened too soon, it is long before they dissolve by suppuration, and even sometimes cause the return of such accidents as very much interrupt the progress of the cure. An instance of what is here advanced may be seen in an account of such an abscess, related in my *Observations*, p. 277. It is not right therefore to open such abscesses, 'till they are ready to break of themselves.

16 OF AN INFLAMMATION.

WHAT we commonly call boils, ought not to be opened till the matter begins to push through the skin. These tumors are generally situated in the *membrana adiposa*, where the matter does not ferment sufficiently to destroy it immediately, but ripening there gradually, is distributed into different cells, like honey in a honey-comb. Thus when the matter first breaks through, all the cells do not discharge their contents at once, but after a few days, the remaining membranes suppurate, and are reduced into *pus*. When these boils are small, it is sufficient to assist nature by maturative applications, and they will heal as they suppurate; but if they are large, it will be necessary, as soon as the skin is perforated (which is a sign the matter is formed) to make a further opening, either by a crucial incision, or several scarifications all over the tumor; that the cells in general may be opened, which are as so many distinct abscesses contained in one tumor.

WE daily see abscesses break without any other assistance than the maturatives before mentioned. In proportion as the applications soften the skin, the matter fermenting wastes and destroys it, and procuring itself a passage, discharges. If these abscesses are small, they will readily heal: The sides of the cavity wherein the matter was deposited, are brought near each other by their elastic disposition, and the cavity fills up; but if they are large, and not situated in very fleshy parts, there generally remains a *fistula*, occasioned by the difficulty of bringing the internal parts of the cavity near enough together. In order therefore to effect a cure, the *fistula* must be opened, and the external aperture made larger than the bottom. *Vid.* the chapter of the FISTULA.

THE

OF AN INFLAMMATION. 17

THE manner of opening abscesses is either by caustick or incision.

L IN order to do it by caustick, the tumor must be covered with a very adhesive plaster, having a hole cut in the middle, of such a form and size as it is intended the aperture of the tumor should be. Into this the caustick stone must be laid, which should first be moistened to render it effectual, as the salts of the solid caustick will not act till in a state of dissolution. The whole must be covered with another plaster, compresses, and a bandage. In two or three hours we take off the dressings, and, if the stone was well prepared, we find a black, hard eschar at the place where the caustick was applied. Through this we pass a lancet, or bistory, as deep as the *pus*, making an incision the whole extent of the eschar, or beyond, if the cavity of the abscess requires it.

IN some cases it is better to make the opening with a caustick than a lancet; as in critical abscesses, which sometimes terminate in malignant fevers; for as the matter that is deposited, either in the glands or elsewhere, may be carried away by the violence of the fever, and re-pass into the blood, it is necessary to open these tumors before the maturation is compleated. The opening made by caustick answers much better in these cases than that by the knife, as it destroys the parts which are impregnated with the malignant humour. The whole eschar should be scarified, and small orifices made where the matter began to form; by which means the humour will be prevented from returning into the circulation. After this is done, we endeavour to digest off the eschar, and bring the wound to supuration.

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18 OF AN INFLAMMATION.

WE would propose likewise to open those abscesses by caustick, which are made by congestion; for as in these cases the fluids are of a cold nature, and maturative applications have but little effect, the irritation of the caustick inflames the part, and helps to ripen the *pus*; and at the same time the largeness of the ulcer which the eschar produces, makes it unnecessary to take off the lips of the wound, and likewise preserves the opening longer.

BUT the most usual, and generally the most convenient, way of opening abscesses, is by incision; and this may be done, either without loss of substance, as by cutting only through the teguments of the abscess; or with loss of substance, i. e. by taking off part of the lips of the wound.

IT is not the size of the abscess that should determine us for either method, but the injury which the matter has done under the *membrana adiposa*, or the skin.

IF the *pus* is superficially situated, and has but slightly separated the teguments from the muscles, it is sufficient to make an incision the length of the tumor. To this purpose, we pass the point of the knife in at one end of the tumor as deep as the *pus*, carrying it on to the other end in a straight direction. We then introduce a finger into the wound, and continue the incision, if it is not already long enough.

WHEN abscesses are situated deep among the muscles, we often meet with membranous bridges which the matter has not dissolved: These should be broke with the finger, or, if that is not sufficient, they should be cut.

IF, by examining the tumor before the opening is made, we find the matter is diffused under the *membrana adiposa*, or the skin, we must not rely

OF AN INFLAMMATION. 19

upon a simple incision, as this would leave a loose lip on each side, which turning inwards would make the dressings painful, and hinder the digestives from being easily applied to every part of the ulcer. In this case therefore we must cut off part of one or both these lips with the scissars or bistory.

To do this in the common way will require at least three incisions; but as we should avoid, as much as possible, giving pain to the patient, I chuse rather to perform it in the following manner. By the first incision, which is semicircular, I cut into the tumor laterally to the place where I should stop if I was to take off one side only, then make another on the other side answering to the first in such a manner that the extremities of each incision shall meet. Thus there will be but two incisions, instead of three, as are usually made, and the patient is thereby spared one third of the pain.

WHEN those large phlegmonous erysipelases, which seize upon an intire limb, as the fore-arm, leg, &c. terminate in a suppuration, we find sometimes that the matter, having separated the greatest part of the *membrana adiposa* from the muscles, spreads perhaps half round the limb. In opening these abscesses, whether it be with or without loss of substance, we are often obliged to make a counter-incision in the part most depending when the patient is in bed; otherwise the matter might stagnate there for want of a free discharge. The manner of doing this is by introducing into the wound either a finger, or a blunt-pointed probe, and thereby fixing the skin; then with the point of a knife we cut through the skin on the outside, as much as may be sufficient, and pass in a seton, one end of which should hang out at the wound.

20 OF AN INFLAMMATION.

IN whatever manner an abscess is opened, we ought at the first dressing to fill up the cavity, where the matter is lodged, with soft lint, that it may not create pain by pressing the lips of the wound.

By the use of digestives, the ulcer comes to suppuration, and in a few days all the circumference that was inflamed discharges itself into the wound; and thus the *pus* that flows from it is large in quantity and of a bad sort; but after this, the quantity lessens, the matter becomes white, thick, and inoffensive: This is the proper time to remove the seton.

THE lips of the wound, which were contracted a little before, come now into a narrower compass, and fleshy granulations arising, the wound fills up, and entirely cicatrises with the usual dressings.

Termination by Gangrene.

THE inflammation may also terminate in a gangrene; but as that appears in different forms according to the different causes which produce it, I shall endeavour to give some account of each; and first,

OF a gangrene by compression. As the free course of the fluids is necessary to preserve life in the different parts, it is not at all surprizing that a gangrene should seize upon the buttocks, back, hips, or elbows of those who have been long afflicted with malignant fevers. The fluids in such cases are vitiated, and those parts suffering a pressure from the posture in which the patient lies, an obstruction of the circulation ensues. The part at first appears pale, then of a lead colour in the middle, and red at its circumference; afterwards it retains the impression of the finger, becomes insensible, and turns black. To

OF AN INFLAMMATION. 21

To prevent this accident, the patient should be carefully watched, and often obliged to change his situation, that no particular place may long suffer a compression; and now and then the parts should be rubbed with brandy to harden the cuticle. If, notwithstanding these precautions, the signs of a gangrene appear; we must then have recourse to surgery, in order to prevent a sphacelus, as will be hereafter directed.

SECONDLY, *Of a gangrene from an internal cause.* This always arises from an impoverishment of the fluids, which renders them incapable of invigorating the parts. There are several things which may produce this alteration. A scorbutick or venereal *virus* is often the occasion of it, but old age more frequently than any other cause. The active principles of the constitution, which animate the fluids, are sometimes destroyed at a certain period prescribed by nature: This often happens to ancient people, though it may likewise be the consequence of great disorders.

THE circulation in these cases becomes languid, and stops at first in some of the capillary vessels of the extremities. The part swells a little, and retains the impression of the finger, is attended with some degree of pain, and changes its colour from pale to livid. Round the circumference may be perceived a slight redness, afterwards a gangrenous ulcer is formed, which will not admit of being deterged, but daily increases. The gangrene spreads by degrees, and at last rising insensibly to the vital parts, the patient dies. Instances of this kind have been seen where the gangrene, which first attacked the toes, was more than a year before it reached to the hip. In such cases, amputation can be of no use, but on the contrary would rather hasten the patient's death.

22 OF AN INFLAMMATION.

I knew a woman fifty years old, of a bad habit of body, who had a gangrene that began by a small spot of the bigness of a lentil, and free from pain, at the end of the great toe, which spread itself afterwards all over that part. My opinion was, not to cut it off, but I was obliged to submit to one of my seniors, who advised the amputation. The gangrene appeared afterwards on the instep, and it was a year before it reached the knee. The person who proposed the amputation of the great toe, seeing the gangrene on the instep, desisted from advising any further operation.

THIRDLY, *Of a gangrene from a defect of the animal spirits.* We find that persons who have received any shock or cut upon the spinal marrow, or suffered any great compression there, as in a luxation of the *vertebrae*, become paralytic in those parts which are below the place that was primarily affected. This is a circumstance not to be wondered at, as the vessels receive their elasticity from the spirits, which enables them to resist the influx of the fluids that always tends to dilate them, and also gives them that oscillatory motion, which assists them in carrying on the course of the circulation. If the animal spirits are no longer conveyed to them by the nerves, the fluids circulate at first more slowly, then insensibly cease to flow at all, and the vessels are obstructed. These parts likewise become emaciated, flaccid, and sometimes intirely insensible; and the least pressure upon them occasions first a gangrene, and afterwards a *sphacelus*.

If we can give relief to the spinal marrow, it is possible to prevent the gangrene; but if that cannot be effected, no other means will be sufficient to stop its progress.

FOURTHLY,

OF AN INFLAMMATION. 23

FOURTHLY, *Of a gangrene proceeding from a stoppage of the returning fluids.* I have known a gangrene brought on by a ligature or compression being made on the trunk of those vessels which bring back the fluids to the heart. This produces a swelling of the part, which hardens and appears of a dark red or violet colour, wherein the patient feels a throbbing and a general numbness, and then loses all manner of sensation in it. Little vesications arise in several places; and at last it becomes black, and mortifies.

It is plain the only way to cure this disorder, and prevent the gangrene, is to remove the obstacle to the blood's return.

FIFTHLY, *Of a gangrene from cold.* We sometimes see members that are frozen become gangrenous insensibly; which arises likewise from obstruction. The cold contracts and hardens the texture of the vessels, as it does every other body in nature; and congealing the fluids, it interrupts their course, and they stop in some of the capillaries the most distant from the heart. The part affected is at first very red and painful, then pale and insensible, afterwards it hardens and turns black, unless the progress of the disease be stopt before it be very far advanced. In this case the fluids are equally disposed to congeal over the whole body, and therefore we must not think so much of restoring that particular part, as to renew a general warmth, by a gentle, mild heat, communicated to the blood. For this purpose, let the patient breathe a moderately warm air, by which the warmth of the fluids being gradually renewed, will re-animate the part affected, and again resume their usual course. It has been observed, that persons who have suffered in this

24 OF AN INFLAMMATION.

manner, by passing over the mountains in hard frosts, have recovered their natural heat much more easily in a stable, than those who have been brought to a fire. Covering the parts with snow has had the same success; whereas others have completed a gangrene by putting them into warm water or near the fire: But if, notwithstanding these endeavours, a gangrene should come on, we must have recourse to those chirurgical operations which will hereafter be described.

SIXTHLY, *Of a gangrene from a carbuncle.* Pestilential buboes, and simple or malignant carbuncles, may be all ranked in the number of gangrenes; for the obstruction in them increases so considerably in a very little time, and the obstructed fluids putrify so fast, that the whole adipous and cellular substances become putrid. *Vide my Observations, p. 48.*

THE skin which covers the tumor appears at first of a dark red in the middle, and a very full red at the circumference; a great heat also and burning pain are felt in the part affected, which proceed from the fermentation of the fluids that obstruct all its vessels; in short, the skin mortifies quite through in a very little time, and likewise the adipous membrane underneath, unless relief be speedily obtained by the assistance of surgery; for the best topics that can be used, will be of no manner of service to prevent the spreading of the gangrene formed in the body of the tumor.

SEVENTHLY, *Of a gangrene proceeding from a phlegmon or erysipelas.* The obstruction may become so considerable, that the circulation in the part may gradually cease. The fluids fermenting
require

OF AN INFLAMMATION. 25

require a larger space to act in ; and the skin, being of too close a texture to yield immediately to their increased bulk, will compress the parts which it contains : hence the adipous parts mortify first, because more liable to pressure ; and a putrid *serum*, proceeding from the fermentation of the obstructed fluids, diffuses itself over the limb. The skin becomes marbled, being in different places black, yellow, livid, pale, of a lively or deep red. The cuticle separates from the skin, and rises in little blisters, filled with a reddish or blackish *sanies* ; after which the parts affected become insensible, and the redness, pain, and pulsation, are no longer to be observed or felt, except in the adjacent parts. If the patient continues ever so little a while in this condition, without proper remedies, the disease gains ground very fast, and extends all over the limb. This is what is called a *spbacelus*, which we can propose no other way of preventing, than by the method we have already pointed out to abate the inflammation.

IF what we have proposed, by way of prevention in these different cases, should prove ineffectual, and the gangrene begins to appear, we must endeavour to relax the skin, and discharge the putrid *serum* : This we may often do by proper incisions and scarifications.

THE ancients advise, at first, only simple punctures, which penetrate no further than the skin ; but these are not sufficient, and it is better to make incisions both through the *membrana adiposa*, and the *membrana communis musculorum*. By this means two ends are answered at once, namely, the skin is relaxed, and a free discharge given to the putrid *serum*, which then passes out from cell to cell.

THE

26 OF AN INFLAMMATION.

THE figure of these incisions cannot be determined where the gangrene affects any part of the trunk : all that can be advised is, to make them as far as the gangrene reaches. As to the gangrenes which seize upon any of the limbs, the incisions there should be made according to the direction of the limb. If it should be one of the larger sort, as the leg, arm, &c. the incisions should be about two inches long and an inch distant from one another. If it is necessary, others may be made below these, observing to make the upper extremity of the second incision rise about half a finger's breadth between the intervals of the former incisions, and so on, if they are repeated lower down.

THE depth of these incisions should reach to the quick, which you will discover by the patient's finding them painful ; and they should be carried lengthways into the inflamed part surrounding the gangrene.

If these methods succeed, the circulation becomes free, and a suppuration ensuing, gradually loosens the hardened eschar. Nature is then to be assisted by dressings with warm digestives ; by the application of emollient and discutient fomentations all over the limb, which will invigorate the part affected ; likewise by cataplasms of the same kind, which, preserving their heat longer, will give a general warmth to the whole member. As the eschars separate, they must be taken off, and the wound dressed according to the state it is in.

If the gangrene degenerates into a *sphacelus*, and is so situated that we are not under the necessity of amputation, or if amputation be not practicable ; we must cut off all the mortified part, making our incisions not only into the dead substance, but to the quick. We must likewise carry our scarifications

cations into the red inflamed parts surrounding the wound, or the gangrene may extend to them. If a limb is intirely mortified, it ought undoubtedly to be taken off; but in order to do this effectually, it will be necessary to make our incisions not only above the mortified part, but also higher than the inflammation which circumscribes it.

OF SUTURES.

THE healthy state of any particular part consists in the perfect structure of the vessels whereof it is composed, and in the just distribution of the fluids passing through them.

By wounds this exquisite mechanism is injured; in some of which the texture of the fibres is broke, contused, and to a certain degree destroyed, as in gun-shot wounds; in others, there is only a simple division of the vessels, without any loss of substance or destruction of the part affected, attended with a discharge of pure blood.

THE only method by which we can restore the parts to their proper state, is by enabling nature to afford her assistance; as in contused wounds, by promoting the separation of the sloughs, without which the nutritive juice cannot form new flesh; and in recent wounds, by bringing their lips so exactly into apposition, that the nutritive juices, which ouze out of them, may effect their re-union; after which, the fluids will resume their usual course.

THE lips of a recent, bleeding wound, always tend to a separation from each other; and therefore the first indication which art directs us to, is
to

to bring them together, and to preserve them in that situation. For this purpose two effectual means occur, namely, suture, and the uniting bandage; both which must be assisted by the position of the part affected.

If either the uniting bandage, or the dry suture, which likewise is a kind of bandage, are sufficient to keep the lips of a wound in their due situation, they ought to be made use of; that is, the uniting bandage to wounds made according to the direction of the fibres, whether in the trunk or extremities, even though made very deep; and the dry suture in all superficial wounds, whether longitudinal, oblique, or transverse: yet neither of these will avail in deep wounds that are either in a transverse or very oblique direction; but in such cases, a proper suture must be made with a needle and thread.

Of the dry Suture.

WHAT the ancients have called a dry suture, ought not in reality to be termed a suture, as it is only the application of one or more adhesive plasters, so disposed, that being fixed upon the lips of the wound, after they are brought together, they are thereby prevented from separating again.

THE form and number of these plasters must depend upon the situation and shape of the wound: The surgeon's chief care in their application should be, *first*, To have the part clean shaved, as the plasters, sticking to the hair, would render it very difficult, and even painful to be got off. *Secondly*, The plaster applied must be very adhesive. The plaster of *Andreas a Cruce*, which is recommended for the dry sutures, or whatever other it be, if it is

is newly made, will melt by the heat of the part affected, and no longer retain the lips of the wound. I have often observed, that almost any plasters, if they are very old, will stick fast, provided they are spread thin, and on very coarse linen. *3dly*, Some small portion of the wound should be left uncovered by the plaster at the most depending part, in order to reserve a free passage for any serous matter, which may ouze out, and which, by being confined, might prevent the re-union, or loosen the plasters by moistening them. *4thly*, The plasters must be made of a sufficient length; for, if they are too short, they will easily loosen, and not sustain the lips of the wound.

Of Sutures with the Needle.

A SUTURE is an operation in surgery, whereby the lips of a wound, made in a soft part, are stitched together.

THE different kinds of sutures may be learnt from their uses and the manner of making them.

As for their uses, we find three that are essential: The first is, to forward the speedy re-union of the lips of a recent, bleeding wound, which is then called incarnative: The second is, to support and sustain the lips of a wound which must digest, in order to prevent them from separating more; and to this suture we shall give the name of contentive: The third is, to stop the hæmorrhages, by closing the mouths of any opened vessels; and may be termed restrictive.

SUTURES differ likewise as to the manner of making them. The ancients used various kinds, which I think it needless to take notice of, and therefore

therefore shall only speak of those, of the use of which we are convinced by daily experience.

THESE are five; namely, the interrupted, the twisted, the quilled, the looped future, and the ligature.

THE interrupted future retains the lips of a wound exactly brought together, and is therefore always to be used when we may expect a speedy re-union. It is proper in slight, bleeding wounds, and where no large muscles are intirely divided. We shall see, in explaining the manner of making this future, that the threads with which it is made, exactly embrace the lips of the wound. The quilled future, as it does not keep the lips of a wound so exactly drawn together, ought rather to be looked upon as contentive than incarnative; accordingly, it is not commonly made use of, unless for such wounds as are very deep, and where strong muscles being entirely cut in two, their great separation leaves no hopes of a speedy re-union. In making this future, therefore, we must dispose the threads in such a manner, that they may conduce rather to balance in some measure the force of these muscles, than to draw the lips of the wound together.

THE twisted future retains the lips of a wound as exactly, when brought together, as the interrupted; and accordingly is incarnative. Nevertheless it is not always proper, and the situation and structure of the part must determine us which ought to be preferred.

THE looped future is only proper for wounds in the intestines. We shall see, in treating of wounds in the abdomen, where it will be necessary to speak of this future, that it is sometimes incarnative, and sometimes only contentive.

To

To conclude, the ligature is ranked amongst the futures, because it is made with a needle and thread ; but, in treating of the aneurism and amputations, it will appear that it is only a pressure fixed upon an open vessel to stop the effusion of blood.

THOUGH it was said above, that a future is only proper for those wounds, whose lips, being brought together, cannot be kept in that position by a bandage ; yet I never meant to affirm it was proper even for all such wounds, since there may be some, where this operation would be absolutely prejudicial.

It would be improper in wounds made by the bite of any venomous or mad creature, as such wounds ought to suppurate ; nor should it be used in contused wounds where the bones are much broken, because of the laceration, and likewise the inflammation, which it is impossible entirely to prevent. The case is the same in gunshot wounds, on account of the eschar which cannot separate but by digestion. It is also improper to use it when wounds are attended with great tension and inflammation, it being then impossible to bring the lips into apposition.

THE ancients forbade making the future in wounds where the bones are laid bare, imagining that every such bone ought to exfoliate, though the wound proceeded from a sharp instrument ; but they were mistaken in this particular ; for we find by experience, that the future is very proper in such cases to prevent the bone becoming carious : nay, though the bone itself should be cut, if it was by a sharp instrument, and is only a simple incision, the future would still be very proper ; for the nutritive juices oozing equally from the
bone.

bone as from the flesh, without being at all corrupted, may form a *callus* there, as they do in a simple fracture. The amputation with a flap, which has succeeded very well, is a proof of what is here advanced; and in my *Chirurgical observations* you may read an account of an arm which I took off in the hospital of *La Charité*, where a proper care was taken to leave a sufficient quantity of flesh: This, being brought together with great exactness, was found, upon taking off the first dressing, to be closed over the bone, and probably united therewith, since the bone never appeared afterwards, neither did any exfoliation ensue. And the same success I have known after the amputation of a fore-arm.

THE ancients likewise forbade the use of the future in contused wounds; but a distinction ought to be made between a great and slight contusion, and also whether or not the wound be complicated with laceration. If it is but slightly contused, the incarnative future may be used; but if much bruised or lacerated, a future barely contentive is necessary, in order to support the lips during the suppuration, and prevent a great loss of substance.

THEY prohibited its use likewise in wounds in the breast, because of the continual motion from inspiration and expiration. It is true indeed that, upon many accounts, it is not convenient for wounds that penetrate into that cavity; but if they do not penetrate, and a future can be of any service, the dilatation which attends the inspiration is not a sufficient reason to exclude the use of it; since it is possible to prevent this motion, which is but moderate, from straining the stitches so far as to hinder the re-union.

BEFORE

BEFORE I enlarge upon the manner of making each of these sutures, I shall give some account of the instruments that are employed for that purpose, which are as follow :

Needles. These are of various kinds : some are straight, others crooked, and some but half curved. Of the straight needles, some are round from head to point, and others a little flat towards the point, and sharp on the sides. All those that are crooked should be flatted at their head. We suppose them formed of good well-tempered steel ; and they ought to be very sharp on each side of the point ; which point should be very fine, unless for some particular reason the edges are taken off, and the point blunted. As they have an eye to pass the thread through, there ought to be a groove on each side, sufficiently deep to lodge the thread in. Again, as the large needles are designed to make sutures in those parts where the muscles are very strong, the body of these needles should be of a sufficient thickness to allow of a deep groove ; for if the several threads were not lodged entirely therein, they could not be passed through without great pain and laceration. The largeness of the body of the needle is no impediment to its passage through the parts.

Pins. These are used in the twisted sutures ; and as they continue in the wound till the re-union is completed, they ought to be made of gold. Any other metal is subject either to rust or canker ; but gold may be tempered like steel, and is not liable to these inconveniences. The point of these pins must be very fine, and their head of a moderate size.

A portaguille. This is but a useless implement, as the head of the needle is not sharp, nor is much force required to make the point of it

D

enter.

enter. It is seldom made use of but to hold the couching needle.

THE ancients used a *canula*, either of a straight or crooked form, that had a cleft or opening in it, to bear up the lip of the wound, through which the point of the needle is to pass out, and to thrust the skin against the point; but if the fingers will serve this purpose, they will do it both surer and quicker. The thumb and the fore-finger of the hand, which is not employed to hold the needle, are the best *canulae* that can be used; and therefore this instrument is in most cases needless.

Thread, silk, and lacing, or small ribband. This thread ought to be strong, even, and well wrought. It ought also generally to be waxed, to prevent its imbibing any moisture, which might rot it. If silk is used, it should be such as is raw, or what has never been dyed. Flat lacing or small ribband has one inconvenience; its edges are stiffer and more tight than its middle part, and therefore in such cases, where it might be of service, it would be better to make use of three or four threads well waxed, laid close together, and flatted. As to round lacing, it is not at all proper.

Necessary Rules to be observed in making the Sutures.

SUPPOSING a wound to be recent, and free from any of the inconveniences before mentioned, and that we have determined upon making a suture, and what kind it shall be, the following particulars are then to be considered:

- I. IF an incarnative suture is intended, and there are extraneous bodies in the wound, they ought to be removed, as they would hinder the lips from being

being brought into contact, and consequently obstruct the re-union. Amongst these we may consider clotted blood.

2. THE wound should be suffered to bleed sufficiently to empty the adjacent vessels; except in wounds that penetrate into the abdomen, where the blood might happen to run into the cavity.

3. If the lips of the wound are indurated, it is necessary to cut off the surface of them; to give passage to the nutritive juice which is to form the re-union. But if there is a laceration with contusion, this precaution is needless, as a contentive suture only is used in that case to support the edges, and prevent their separating farther.

4. WE must either wait till the wound has done bleeding, or restrain the hæmorrhage by touching the lips with some slight styptic; such as white vitriol, powdered and wrapt up in a very fine rag. For want of this precaution, some blood passing out of the vessels, and stagnating between the lips of the wound, might prevent their re-union.

5. If the wound has one or more hanging lips of an irregular figure, the first stitch must be made at the angle of each lip; but if there are none of these, and several stitches are required, we must begin with that in the middle, unless in wounds of the abdomen, for reasons that will be mentioned in treating of the *Gastrotomy*.

SUPPOSING the wounded member placed upon a horizontal plane, and the wound perpendicular; if it passes transversely the line of the limb's direction, the entrance and going out of the needle should be at an equal distance from the edges of the wound, and the depth of the wound ought to be the measure of this distance; because the

threads, when the future is made, are to describe a crooked line in the thickness of the flesh: that is, if the wound is half an inch deep, the entrance and going out of the threads must be half an inch from the edges, and so in proportion. But the case will be different if the wound happens to be slanting, and forms a sort of flap of one of the lips: Its bottom will not then be perpendicular to its entrance; and if the passage in and out of the threads were placed at an equal distance from the verge of the lips, the middle of the curve, which the thread should describe in the flesh, would not be answerable to the bottom of the wound; neither would it support it. In this case, therefore, the entrance of the first needle must be almost at the edge of that lip which does not form the flap, and it should come out at the other lip which does form it, at a greater or less distance from the edge according to the depth of the wound. This done, the middle of the curve line described by the thread will answer to the bottom of the wound.

6. IF a muscle is entirely cut through, though it be obliquely, we must dispose the points of the needles in such a manner that the threads may follow the same direction as the fleshy fibres; otherwise the two parts of the muscle would separate notwithstanding the future, and would render it useless. For instance; a trooper has newly received a cut with a sabre, in the middle and forepart of the thigh, which divides transversely the extensor muscles of the leg; the threads which make the future ought to be disposed according to the length of the thigh, making a right angle with the lips of the wound. If the wound, instead of being transverse, cuts the muscles obliquely, the threads ought equally to be disposed the long way of the thigh, which will be according to the direction of the

the muscles ; and then they will cross the wound in an acute angle.

7. IF it is a very deep wound, and it is necessary to make the quilled future, there being no expectation of a speedy re-union, the chief intention to be answered, is to support the muscular fibres which are nearest to the bottom of the wound ; and therefore the threads must pass within the bottom of the wound itself.

THE future being made, the thread will necessarily describe a semi-circle in the thickness of the flesh, and the middle of this curve must answer to the bottom of the wound. The rule, before laid down, for the entrance and going out of the threads in the interrupted future, cannot take place in this, but should be made at a greater distance ; for as the curve described by the threads when the future is made, has always a tendency to become straight from the contraction of the muscles, the lips of the wound would be separated from each other. This inconvenience may be prevented by making the entrance and going out of the needle at a greater distance ; for the more distant they are, the less crooked will the curve be, and the less will the force of the muscles be able to straighten it.

8. WHATEVER future is made, we must be cautious, while we introduce the needle, to avoid pricking any considerable tendon, nerve, or vessel.

9. WHEN the thread is passed, care must be taken to have the lips of the wound brought sufficiently close together by an assistant ; after which the thread that is to hold them so, must be immediately fastened.

10. WE must observe also, that the knot be made at the least depending part, that it may not im-

bibe any blood or matter, which when they became dry, would render it hard. The first knot ought to be a single one, and over that a running knot to tie or untie occasionally.

II. WHEN the interrupted suture is made, and there is reason to expect a discharge from the wound, a passage for it must be preserved at the most depending part, by leaving that less closed than the rest.

SEVERAL particulars are likewise necessary to be observed in regard to the dressings :

1. IF the suture is only contentive, that is, to support the lips of a wound which must necessarily suppurate, digestives are to be used ; or such other remedies as the case requires.

2. IF an incarnative suture is made with an intent to procure a speedy re-union, we must avoid making use of suppurative medicines, and cover the wound with a linen rag dipped in some glutinous balsam ; as balsam of Capivi, Canada, Peru, or any other that will prevent the air's penetrating to the sore, as it might corrupt the nutritive juices that are to produce the re-union.

3. IT has been already observed, that at each stitch there must be a single knot, with another over it to tie or untie occasionally ; and as this knot, should it imbibe any blood, would grow hard when dry, and be difficult to loosen, to prevent this inconvenience, it may be moistened with some oil, or pomatum, and covered with a small compress softened in the same manner.

4. WHEN the suture is made, it is proper to assist the stitches by the dry suture ; for want of which precaution, it has often happened, that the threads have cut through the skin, and the first suture been rendered useless.

5. If bandage can be of any service to support the lips of the wound, and strengthen the future, it ought to be applied; but as a future is never chosen but when a bandage will not serve to keep the lips together, it seems to be useless. We may add yet farther, that it would rather obstruct the re-union: For instance, in the wounds we have supposed in the thigh, a circular bandage would necessarily draw the angles of the wound near together, and the lips would be separated; which is contrary to the intention of the future. A rolled bandage therefore is not only useless but hurtful.

6. THE part affected must be placed conveniently to forward the return of the fluids; it should be laid softly, to avoid giving pain, and in such a position, that the muscles upon which the future is made, may be in a state of relaxation. Another very essential circumstance is, to have the part kept still, otherwise the stitches would be strained, the lips would separate, at least for some moments, and the nutritive juices no longer cohering between the lips in order to perform the re-union, would be converted into pus.

To these precautions must be added, a proper regimen, bleeding, and such other remedies as are useful either to prevent the inflammation, or remove it, if it comes on; and (which ought by no means to be omitted) we must be careful to observe whether the wound grows inflamed, in order to judge, according to the degree of the inflammation, if it may be proper to loosen the stitches till that is abated.

It is also proper to take off some of the dressings at the end of twenty-four hours, that we may discover if any drops of moisture are confined at the most depending corner, as their lodgment be-

tween the lips would prevent the re-union, and produce a suppuration.

WHEN it is time to take out the threads, they must be cut at the lip opposite to the knot; then pressing against the other lip with your finger, and loosening the knot, you draw away the threads without pain. But as the cicatrix is still tender, it would be easily broke open, and therefore the part must be kept some days longer perfectly still, and for the greater security the lips should be supported by the dry suture.

IN treating of wounds in the *Abdomen*, and of the *Gastroraphy*, I shall have occasion to speak of the looped suture: when we come to the article of the hare-lip, I shall describe the manner of making the twisted suture; and when we are treating of amputations, I shall mention the method of making the ligature. At present therefore, I shall begin the several operations with the interrupted and quilled futures.

Of the interrupted Suture.

THE interrupted suture, as was before observed, is incarnative, and serves to retain the lips of a wound when brought into contact: it ought therefore to be used for recent wounds, which are not so deep as to divide large muscles quite asunder. Suppose, for instance, a transverse or oblique wound made by the stroke of a sabre in the fore-part of the thigh, which is three inches long and one deep: and where the extensor muscles of the leg are but partly divided. This wound requires nothing more than to be speedily re-united, and we are sure, by keeping the lips well closed, the nutritive juices, which issue thence, will answer this

this purpose. If the wound has done bleeding, I take a crooked needle, armed with two pieces of strong, waxed thread, and enter it into one of the lips within an inch of the edge. Where the length of the wound requires three stitches, I begin with that in the middle; was it somewhat shorter I should make only two, and so in proportion. If it has more than two angles, is of an irregular figure, and forms a kind of hanging lips, I first make a stitch at the point of each of these lips; and of whatever figure the wound is, the direction of the stitches should always answer as much as possible to the direction of the muscles that are cut. I pass the needle deeper than the bottom of the wound, and bring it out at the other lip, about an inch from the edge, so that the thread incloses all the divided flesh. I then make two other stitches in the same manner; which done, the two lips are to be brought exactly together by an assistant, and preserved in that situation by tying the two ends of each thread on the superior lip.

THE wound is to be covered with a piece of linen rag dipt in some glutinous balsam, to prevent the air from penetrating, and thereby corrupting the nutritive juices.

I afterwards strengthen the stitches by supporting the lips with a dry suture, which we make with slips of linen spread with sticking plaster, of a breadth proportionable to the spaces between the threads, and about five or six inches long: these we fix upon the skin between the stitches, so that they support it, and hinder it from receding.

THE whole dressing consists of two compresses, namely, one to cover the wound, and another which goes round the limb, and is fastened with pins.

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THE situation of the part ought also to correspond in answering the intention of the suture; for which purpose, we extend the leg in such a manner, that the muscles which have suffered, may be relaxed; and then fix it in this posture, that no unforeseen accident may displace it.

WE must endeavour likewise, by a strict regimen and bleeding, to prevent an inflammation of the wound, or to remove it if it supervenes, by the application of anodyne cataplasms; and if, notwithstanding the use of these means, the inflammation should become very considerable, we must loosen the stitches; which would then be only contentive, as the wound will necessarily suppurate.

BUT, supposing this should not happen, the dressings ought not to be taken off till about the fourth day, and then with great caution, to prevent straining the part; and the stitches should remain in till the skin is healed. The use of the dry suture should be continued some days after the threads are removed, and the limb left in the same posture to allow the cicatrix to harden; especially that which is formed in the muscular parts.

Of the quilled Suture.

IN order to explain the quilled suture, we will again suppose a wound in the forepart of the thigh; and, to render it more instructive, let us suppose it in a slanting direction, making a kind of flap of one of the lips, and the wound oblique and complicated with an extraneous body, namely, part of the edge of the sabre which remains in the fleshy part of the thigh. In dressing this wound, wherein great part of the extensor muscles of the leg are divided, we may apply almost all the general rules before

before laid down concerning the making of sutures.

It is in vain to think of bringing the lips of such a wound together, and confining them so by bandage. It will be necessary therefore to make one or more sutures, and the most proper upon this occasion will be the quilled: first, because the wound is too large to re-unite without suppuration; secondly, because the figure and depth of it will not admit of the interrupted future. The bone being wounded, as has already been observed, would be no obstacle to the re-union either of that or the flesh; but as the extraneous body might, we must begin by extracting that, and be careful not to leave the least part of it. If it sticks in so fast as not easily to be taken out with the forceps, we must scrape away some of the bone either with a small gouge, or a fine file, directed along by the extraneous body, in order to enlarge the place wherein it lies, and to extract it with more ease. The surgeon's own judgment will direct him how to make such alterations in this method as he finds necessary.

In order to perform this operation the more conveniently, and with the greater safety, it would be proper to separate the lips of the fleshy wound by extending the patient's thigh and bending the leg.

THE extraneous body being removed, the wound should be washed with warm wine, to cleanse away the clotted blood; and if it still bleeds, we must either wait till it stops of itself, which it will frequently do in a few minutes, or suppress the bleeding by touching the lips with a little bag of white vitriol calcined.

THE next thing to be done is to make the future; but first we must extend the patient's leg, in order to
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to relax the lower parts of the muscles and bring the lips of the wound near each other. Whilst an assistant with both his hands brings the lips together, I prepare a crooked needle of a sufficient length, armed with two pieces of waxed thread, whose four ends are joined together by one common knot. I introduce the point of this needle at the lip opposite to that where the flap is situated, and exactly at the edge of the wound. Then directing the point so that it passes to the bottom of the wound, I carry it through the thickest part of the other lip, till it comes out at three or four fingers breadth from the edge of the flap, more or less, according to the thickness of the flesh; I take care also to pass the threads according to the length of the limb, as if the wound was transverse; contriving so, that the middle of the curve, described by the threads when passed, is exactly at the bottom of the wound. Having made the first stitch at the middle of the wound, I add, if necessary, two others, one on each side; and then place a roll of waxed linen, about the bigness of a quill, through the loops made by the joining of these threads at every stitch. This roll, which serves instead of a quill, fixes the ends of the threads in such a manner on this side, that it bears up one of the lips of the wound. After this, I cut the threads near the head of each needle, and every stitch consisting of four threads, I range them two and two together, placing between them another roll of waxed linen, like that we used at the former lip; I then join them by a knot over the roll, so that both lips of the wound are supported. The first knot of each stitch is to be a single one, secured by a running knot over it, that it may be loosened at pleasure; and the knots are to be placed upon the side of the flap, to prevent

vent as much as possible their being moistened by the *pus*.

IT now remains to take care of this flap formed by one of the lips of the wound, for the suture fixes that but imperfectly, being chiefly designed to bear up the body of those muscles, the divided parts of which separating very much, would make a gaping wound. This may be done by two sticking plasters, laid between the stitches, and forming what is called the dry suture.

WE then moisten the knots with a little oil, or pomatum, to prevent their growing hard, and cover them with a small compress softened in the same manner.

THERE is no room to hope that such a wound will unite without coming to digestion, at least some serous matter will ouze out, which should not be suffered to continue in the wound; and upon this consideration we ought not to make use of any glutinous balsam, but only apply some dry lint or linen upon it, to absorb the discharge.

A circular bandage would be quite improper in this case, as it would draw the corners of the wound near each other; for which reason a circular compress loosely put on and fastened with pins to keep on the dressings, will be all that is necessary.

THE patient's leg ought to continue extended, and for the greater safety it would not be amiss to secure it in that posture: as the least flexion would in all probability strain the stitches and bring on an inflammation; a symptom which was too much to be apprehended before. Should this happen (from whatever cause it may proceed) notwithstanding the low diet and frequent bleedings which ought in such cases to be used for prevention, and should it increase considerably, the stitches must be loosened,

loofened, and drawn tight again when the inflammation is gone off.

THE wound must be dressed according to the condition it is in; and if the lips can be kept thus fixed during the formation of new flesh, it will be a great help to nature.

Of the Suture of a Tendon.

HAVING thus described the quilled future, I proceed next to speak of the future of a tendon; the quilled future being proposed by authors to be made use of in the re-union of divided tendons. But let us here recollect what has been before observed, namely, that when we can bring together the divided parts, and keep them in that situation by bandage and a proper position of the limb, we ought never to make use of sutures.

THIS being granted, there will never be any necessity to use a future for divided tendons, as the situation of the part will bring the ends together. For instance, if the extensor tendons of the fingers are divided, it will be sufficient to place the limb in a box, and to fix it there in such a manner that the wrist be turned back and the fingers extended. By this means we may bring the ends of the divided tendon exactly into apposition, and even to wrap over one another, if the extension be made to a certain degree. The hand and fingers are afterwards to be kept in the same position; by which the re-union will be effected, and the wound in about three weeks consolidated: And how could the future answer the purpose better?

If a tendon is cut, the ends of which cannot be brought together and kept in that state by the situation of the limb, the future will then be useless. If there is any case where it can be proposed, it is,
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when a tendon has been cut for some time, and the part not having been put in a proper situation, the contraction of the body of the muscle has so separated the divided parts, that they cannot be brought together by any particular position. But even in this case the future would be of no service, since the intention of it is not to draw the divided parts together, but to keep them close when they are so; and this cannot be done here, because the ends of the tendon have united themselves with the adjacent flesh. To conclude, though the future of a tendon has been recommended, and practised by the ancients, and even by eminent modern surgeons, I look on it as an operation which ought not to be used, and therefore shall not describe it. The frequent experience I have had of the re-union of tendons, both broken and cut, even of the *tendo Achillis*, which has been procured only by the situation of the part and a proper bandage, sufficiently convinces me that the future of tendons is unnecessary.

Of WOUNDS in the ABDOMEN, and of the GASTRORAPHY.

WOUNDS of the *Abdomen* may be divided into such as are either superficial, or penetrate into the cavity. I shall pass over those that are merely superficial, as they are in no respect different from slight wounds in other parts.

Of such as penetrate into the cavity, some are simple, others complicated. I call those simple, wherein none of the parts contained in the cavity are either hurt or forced out; and even where some

of them do appear out of the wound, if it is sufficiently large to admit of their being easily reduced without an incision, I still consider it as a simple wound. I call those wounds complicated, wherein some of the *viscera* are hurt, or where some of them, whether hurt or not, are protruded, so as to require the wound to be enlarged in order to make the reduction; besides which, there may be several sorts of complications in these wounds.

THERE are wounds which visibly penetrate into the cavity; for instance, those where some of the *viscera* issue out, or such as are large enough to admit a finger, or at least a probe, into the belly, without difficulty. There are others, which are so small, that, notwithstanding all possible care to place the patient in the same posture he was in when he received the hurt, the probe cannot be introduced; which makes it difficult to determine whether the wound penetrates into the cavity. In this case the wound either does not penetrate, or, if it does, it is without affecting any part internally; or it does penetrate, and is complicated with a hurt of some of the *viscera*: All which differences ought to be well considered by the surgeon, that he may apply himself to the proper method of cure which these different circumstances of the case may require.

If the wound does not penetrate into the cavity, it differs not from slight wounds in other parts, and therefore requires no particular directions about the treatment of it.

If it does penetrate into the cavity, but without injuring any of the *viscera*, even though some of them should be protruded, it ought to be dressed as a simple wound, and when the parts are reduced, requires a speedy re-union.

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At the same time the surgeon should enjoin the patient a very strict diet, and take away a sufficient quantity of blood; for the muscles of the *abdomen* being in a continual motion from the action of respiration, *viz.* alternately extended and contracted, there is room to apprehend an inflammation of the *peritonæum*, which lines the internal surface of the cavity.

I HAVE before observed, that the re-union ought to be endeavoured as soon as possible; but if a small wound is made through one of the *musculi recti*, we must deviate from this rule, and by an incision enlarge the opening of the skin, fat, and sheath, that covers this muscle; the intestine having been frequently known to be strangulated in such wounds, and to produce a *hernia* between the muscle and that part of the sheath which passes underneath it; while the smallness of the outward opening prevented its being distinguished. These *herniæ* are attended with such symptoms as make it difficult to determine from what cause they take their rise. The incision that I propose in such a case does not hinder the re-union of the bottom of the wound, but rather promotes it, by giving a free passage to the *pus* which may be collected amongst the teguments.

WOUNDS that penetrate, and are complicated with a wound of some one of the *viscera*, require a dilatation of the external orifice, instead of a speedy re-union, and also different precautions, according to the nature of the part injured. The surgeon therefore must endeavour to discover which is the part affected: and this he may do, by rational indications, drawn from the situation of the wound, the nature of the pain, the function injured, the excretions or the discharges from the

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wound, and the symptoms proper to wounds of the several *viscera*.

If the wound is in the *epigastrium*, or the left *hypocondrium*; or, though differently situated, if the oblique direction of it tends towards one of those regions, we may suspect the stomach to be hurt. The pain in this case will be violent; especially if the wound be near the upper orifice, and may be attended with frequent convulsive reachings. If the smell of liquors which the patient has lately taken, or any aliment, issue from the wound, it is a certain indication of such an accident.

As the liver possesses the whole cavity of the right *hypocondrium*, it is probable that may be injured, if the wound penetrates there; and as its middle lobe advances into the *epigastrium*, it may also be hurt if the wound penetrates into this region. The liver is not very quick of sensation, and therefore may be wounded without our being made immediately sensible of it by any violent pain; but though the pain may be slight at first, it may grow very severe soon afterwards, by the inflammation of its external membrane. It is observable, that notwithstanding a great deal of blood passes through this gland, yet as the texture of it is close and compact, it sometimes discharges but little blood, even from deep wounds made in it. To conclude, the liver may be rendered incapable of performing its offices; that is, the secretion of the gall may be suspended by the inflammation, which will prevent the chyle's being perfected in the duodenum. This may be distinguished by the excrements not being tinged with bile.

WE may have reason to suspect the gall-bladder's being hurt from the situation of the wound
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and its direction; but if bile is discharged at the wound, you may certainly determine that to be the case.

If the wound is in the left hypocondrium, and attended with an hæmorrhage, there is reason to apprehend the spleen is wounded: but this is generally so violent, that it hardly allows time for the application of any remedies, unless the wound be superficial.

If the direction of the wound should tend towards the *diaphragm*, it is probable that may be affected, and the pain will then be more or less acute, according as the wound has penetrated either into its fleshy or tendinous part, in the last of which it would be most violent. The respiration, whereof this is one of the principal instruments, would in such a case be difficult, interrupted and convulsive; the patient would also be affected with an involuntary laughter, called the *risus sardonicus*, which is a convulsion, almost inseparable from wounds in the *diaphragm*.

If the mesentery is wounded at its centre, or towards its narrowest part, where it joins to the vertebræ of the loins, and where the plexus mesentericus is placed, the accident is hardly distinguishable but by the acuteness of the pain. The inflammation of this part may extend to the intestines, and cause a suppression of the *feces*, with vomitings.

ALL wounds penetrating the belly, in whatever region they happen, may be so directed as to affect some of the intestines, because they fill up the greatest part of its cavity; and this cannot be discovered, unless some excrement issues through the wound, or blood be discharged with the stools. An inflammation of the *canalis intestinalis* and a

nausea, are symptoms which constantly attend such an accident ; but as these symptoms may happen without the intestinal canal being injured, they are but uncertain signs.

IF the kidney is injured, the situation, or at least the direction and depth of the wound, may give room to apprehend it ; but the proper proofs of it will be the seat of the pain, and a discharge of bloody urine.

THE bladder may be hurt at its *fundus*, or towards its neck, of which we may form some judgment from the situation of the wound and its direction. If the wound, entering above, tends downwards, and piercing the membrane that covers the bladder in the *pelvis*, opens it at the *fundus*, the urine may then run into the belly ; and being no longer confined in the bladder, the patient will not have any inclination to make water. If it be opened in the neck, some urine will pass through the wound, and if any comes through the *urethra*, it will be bloody, supposing the wound to have been made by a sharp instrument.

IF any large blood-vessel be opened in the cavity, death will speedily ensue ; if a small one, but such a one as constantly keeps discharging, the patient will grow weak, and sink into frequent faintings. See my *Observations*, p. 300.

THE several cases before mentioned require particular attention : and in all of them we cannot be too careful to keep under the inflammation, this symptom being the source of a thousand other accidents ; and was it always possible to moderate that, there would be very few wounds which would not heal. In all these cases then, for I must repeat what I have said before, far from thinking of a speedy re-union, we must, on the contrary, enlarge the
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the opening of the skin and fat, to give a free passage to the matter, or whatever else may issue from the parts wounded.

I now proceed to the wounds that penetrate, and are complicated with the protrusion of some of the *viscera*.

THERE are but three of these that can issue from the belly through a wound, which are the stomach, the *epiploon*, and the intestines; and these may pass out either singly or together. The parts which are forced out thus, may be found and in a good state, or they may be wounded or disordered. In all these cases the wound is either large, and will admit of the reduction without difficulty, or it is small, and the protruded parts are strangulated in such a manner as to hinder their being reduced; and each of these symptoms requires a different method of treatment.

SUPPOSING the wound large, and the protruded parts found, they must be reduced as soon as possible. It is not uncommon for them to be found cold, and covered with dust, or blood; in which case, before the reduction is made, they should be washed with some warm liquor; and as urine is always at hand, it may very well serve for this use. As to the parts themselves, we must treat them according as their different appearances, which we are next to take notice of, shall require.

IF some of the *viscera* push out through a small wound, we must treat them according to the nature and condition of the parts.

WHEN the *epiploon* alone passes out through a small wound, it will be strangulated, and the teguments of the abdomen, making a kind of ligature round it, will become tighter in proportion, as the wound closes. In this case, we might cut

off the *epiploon* close to the skin, without making a real ligature upon it; but it would be much better not to do so, as that part of the *epiploon* which fills up the wound, might retire into the belly and leave the wound open; and as the lips of a wound in the *peritonæum* will not unite with each other, the opening which it leaves under the teguments might afterwards give occasion to a *hernia ventralis*; it is better, therefore, not to cut it till the part that appears out begins to decay: this might give time to that portion of the *epiploon* which fills up the wound in the teguments, to adhere to them, and thereby prevent the *hernia ventralis*.

THE intestine issuing out of the wound may be found in three different states; and to set this in a clear light, I will suppose three men to have each received a thrust with a sword that has entered the abdomen: that all the three wounds are very small, and that in each of the three, part of the intestine and *epiploon* appear.

IN the first, the intestine is wounded, notwithstanding its projecting out of the belly (undoubtedly because it received the injury after its coming out, for an intestine that is wounded while in the *abdomen* will not come out unless the wound be large). In the second, the parts are strangulated, and the intestine gangrened, in consequence of the continued strangulation. In the third case, the intestine is not wounded, but the parts are strangulated in such a manner, that the intestine is puffed up, and spreads over the external orifice, so as to prevent our conveniently seeing the opening through which it passed. In these three cases, the surgeon ought to dilate the wounds of the teguments as soon as possible, to take off the strangulation, which having suspended the course of the fluids

fluids in the parts that are forced out, has occasioned the inflation, inflammation, and gangrene; we must deviate therefore from the general rule, which directs us to prepare every thing ready for the operations and dressings before we begin to operate; and, in order to perform our work conveniently, the patient must be placed upon his back, with his breast and knees a little raised, that the teguments of the abdomen may be the less upon the stretch.

IN whatever region of the belly the wound is, and however its direction may tend, it is almost always proper to make the dilatation at the inferior angle; and as the intent of dilating it is to reduce the parts, the incision must be made proportionable. It is better, however, that it should be too large than too small, that the intestine may not suffer in being returned into the belly.

IF the wound penetrates one of the *musculi recti*, the skin causes a strangulation in the first place; and it is not impossible but the tendinous sheath of this muscle may produce a strangulation under, and upon the muscle; but if the wound be situated elsewhere, the skin alone will cause the strangulation, for the *peritonæum* scarce ever does. In which case, we must first divide that only, without touching the *peritonæum*; and upon this account I should reject the method hitherto proposed by authors, to dilate the whole wound.

IN whatever part of the belly we are obliged to make the opening, we introduce a director under the skin, taking care not to let it pass into the cavity; then sliding a straight *bistoury* along the groove, we make a sufficient opening in the skin to admit a finger with ease; which is generally large enough to allow of the reduction. If the

wound is not made in one of the *musculi recti*, we then examine with the finger whether the *peritonæum* makes any resistance, or suffers us to introduce it into the belly; for in the last case it would be needless to carry the point of a bistory into the cavity, where it might happen to wound the intestine.

If the wound is in one of the *musculi recti*, I introduce my finger to the bottom of it, and feel whether the *aponeurosis* is sufficiently divided by the instrument that made the wound, and whether it can obstruct the easy reduction of the parts. If it does obstruct the reduction, the finger that is in the wound, serves instead of the director; so that passing the back of a bistory along this finger, till the point of it is advanced as far as the second strangulation, it is easy to divide it without being obliged to carry the point into the belly. When the intestine is found, it is sometimes so filled and distended with wind, that it covers the wound, and makes it difficult to discover its situation; and yet it is necessary, in this case, to dilate the wound; and in order to do that, if we cannot introduce the director, we cover the protuberated intestine with the hand, and conveying the fore-finger of the same hand underneath it, we put the edge of the nail even with the wound, in order to guard the intestine; then introducing, by the help of this nail, a blunt-pointed, crooked *bistory*, we dilate the orifice of the wound sufficiently to pass in the probe easily. This done, we continue the dilatation, and immediately introduce the fore-finger, to feel whether the *peritonæum* is opened enough to admit of the reduction; if it is not, we dilate the wound in the *peritonæum* with the end of a blunt-pointed *bistory*,

bistory, conducted along the fore-finger; for want of which dilation we might separate the *peritonæum* from the muscles in reducing the intestine. In this method we run no risque of injuring the intestine by dilating the wound, which is an accident that might happen in following the method described by authors.

THE strangulation being removed, let us next see whether the parts must be reduced; and here the intestine first demands our consideration. If it is distended, it is certainly neither hurt nor gangrened, as this appearance of it proceeds partly from the obstruction of its vessels, and partly from the wind which fills its cavity.

As to the wind, we must first endeavour to move it back into that part of the intestine which remains in the belly, by gently pressing the protruded part with the fingers. This precaution is very necessary, as the intestine might otherwise suffer greatly, and be bruised in reducing it. The inflammation will require some time to go off, and therefore the reduction must be made directly, the natural heat being of great service, and more efficacious than all the topics that can be applied. In order to reduce the intestine, we move it into the belly with the two fore-fingers alternately; putting that part of it in first which came out last, and taking care not to bruise it. The intestine being reduced, we are to push it gently beyond the orifice with the finger that conducted it thither.

THE intestine may be wounded, either with, or without loss of substance. When there is only a simple incision, we must make the looped suture in it, before we attempt the reduction. The texture of the intestine is too thin to admit the
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lips of a wound in it to re-unite one with the other, as is usual in wounds of the flesh, and therefore a wound in the intestine cannot heal but by adhering to some neighbouring part, or by its internal coats being preserved in contact with each other after a future has been made, and uniting together, as we often see parts adhere by a slight inflammation; for instance, the adhesion between the intestine and the *peritoneum* that sometimes happens in *hernia*. Now, in order to promote this adhesion of its coats, such a future must be made as will not suffer them to separate from each other; and this is done by the looped future, which I think preferable to that commonly proposed by authors, termed the glover's future.

It may be asked whether a small wound requires any future, and whether the exact diet which the patient ought to observe, is not alone sufficient to produce a re-union; and the rather as there ought not to be chyle enough in the intestines to occasion a distension of their coats; but we should certainly find, that, when the chyle is wanting, the wind will distend them; consequently it will be better to make a future that may perhaps be needless, than to neglect doing it when necessary. It is true indeed, patients have been known to recover, whose intestines have been wounded by the thrust of a sword, without any future being made, because they never appeared out of the belly; but all have not been thus cured, which may probably be owing to the impossibility that there sometimes is in making the future.

In order to make the looped future, an assistant takes hold of one end of the wound, whilst the surgeon does the same at the other, and the needles,

THE ABDOMEN. 59

needles, which should be round, straight, and small, carrying each of them a thread a foot long, and not waxed, must be equal to the number of the stitches intended to be made. I then pass through both lips as many threads as are necessary, taking care that they are a quarter of an inch, or thereabouts, distant from each other. All the threads being thus passed, I draw away the needles and first tie together the ends of the threads on one side, and then do the same on the other; after which, joining them together, I make a sort of a cord, by twisting them twice or thrice round. By this means we purse up the divided parts of the intestine into a kind of pucker, so that the stitches, which before were distant about a quarter of an inch, are now brought close to each other, and thus the lips of the wound, being prevented from separating, produce an adhesion without the intestine's being obliged to unite itself to any other part.

THE suture being made, the assistant is to hold the two ends of the twisted threads, whilst the surgeon performs the reduction of the intestine, as was before directed.

IF the intestine is wounded with a small loss of substance, we use the same suture; but if the loss be considerable, two or three threads must be passed through in the nature of a loop, to keep it fixed at the most depending part of the wound; to the end, that if any chyle, or matter, should issue from it, they may not be discharged into the belly.

IF the intestine is black and mortified, it would be dangerous to reduce it in such a state, as the natural heat cannot cure a *spbacelus*: it can only separate the mortified part from that which

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is found, which it will do in about six or eight days, when the intestine being open, the chyle, or excrements, would be diffused within the cavity. To prevent this inconvenience, we must anticipate the operation of nature, by cutting off the part that is mortified, and then fix the open intestine, by one or more stitches of the looped suture, at the lower part of the wound, as we before advised when speaking of a wound of the intestine attended with loss of substance.

If part of the stomach appears without the wound, as it is possible it may do, it requires the same manner of treatment as has just been directed for the intestine.

SOMETIMES part of the *epiploon* may come out with these, which if it be found, and the wound large, though it should begin to grow cold, must be immediately returned into the belly again, as the natural heat will assist greatly to restore its warmth, and renew the circulation which had been suspended in it. But if this portion of the *epiploon* be either gangrened, or disposed to gangrene, which may be known from the alteration of its natural colour, it must be cut off. In order to do this, I quit the lips of the wound for a moment, which must be so held together by an assistant as to prevent the intestine pushing out any farther; and if the gangrene has seized upon so much of the *epiploon* as lies out of the abdomen, we must draw out a little more of it till we discover the sound part, through which we are to pass two pieces of waxed thread, making a tight ligature of each, and cut off what is mortified about a finger's breadth below. This ligature must be fixed at the most depending part of the wound, not in the *abdomen*, but to the teguments, in such a manner

manner as to stop the orifice, and prevent the intestines pushing out again. By this means the part of the *epiploon* that is tied, being separated by the digestion, will come away with the ligature, and cannot possibly fall into the cavity.

HAVING now answered the first curative intention, by reducing the parts, we are next to perform the second, by a suture called *gastroraphy*, which is termed so not on account of the manner of making it, but because it is used for the belly. By this suture we sew and keep close together the lips of the wound in the teguments, so as to prevent them from separating, and thereby hindering the reduced parts from coming out again. This is done by the interrupted suture.

It is proper to observe here, that this must never be used but in those cases, where, on account of the largeness of the wound, we cannot dispense with it; for as this suture must necessarily strain the *peritonæum* and the skin, and as this straining will be painful, and subject to produce an inflammation; if the parts can be kept within the belly by any other method, it ought to be preferred. It was to prevent, if possible, making use of this suture, that in dilating the wound I recommended only such an opening to be made as was just sufficient to reduce the parts, and no more. If an incision about an inch long is sufficient for the reduction, the *gastroraphy* would be unnecessary; and provided care is taken to retain the parts, so as they may not burst out again, the wound will heal as well as if the suture had been made. Supposing, however, it should be necessary to perform this operation, the number of the stitches must be more or less, according to the size of the wound, and made two thirds of an

an inch from each other, and from the angles of the wound.

THOUGH, in making other futures, if several stitches are required, we begin with the middle one, yet in this sort of future, we are to begin by making the first stitch nearest to the superior angle, proceeding to the rest afterwards. It will be necessary, in making each stitch, to have two crooked needles, armed with the two ends of the same thread formed of three or four pieces well waxed and joined together. The interrupted future is preferred, as procuring the quickest re-union.

SUPPOSING the future made in the intestine, and the ligature on the epiploon, we immediately place the threads of these futures in a proper manner. If the future of the intestine is designed only as incarnative, with intent to procure the re-union, we take care to place the threads at the superior angle of the wound before we make the first stitch in the teguments; but if a contentive one only, as in the case of loss of substance, or a gangrene, we place them at the most depending angle; where we likewise fix the ligature of the *epiploon*.

WHILST an assistant keeps the threads in the situation I had placed them, I introduce the end of my fore-finger of the left hand into the belly, and taking one of the needles, with the thumb and fore-finger of the right hand, I lean the crooked part upon the finger which is in the belly, so that the point is in a manner sunk in it. This finger then conducts the point of the needle without danger of pricking any of the *viscera*, and fixes it on the inside of the belly in the thickest parts of the teguments, in order to pass it from thence to the outside. Upon this, the head of the
needle

needle being received into the palm of the left-hand, is kept fixed by the other four fingers, while with the right hand I press the skin against the point of the needle, that it may pass the more easily. At the same time I push on the head of the needle with the palm of the left-hand, and draw out the point with the right. This done, without taking the fore-finger of the left hand out of the belly, I turn it towards the other lip of the wound, and taking the other needle, threaded with the same thread as the former, in my right-hand, I fix the point again upon that finger, as was done for the other lip; and the finger, serving to guide the needle safely as before, helps it to pierce the teguments on the inside of the belly, at the same time that the left thumb presses the skin against the point, that it may pass the easier. After this, without drawing the fore-finger out of the wound, I make a second, and third stitch, if necessary.

THE threads being all passed, I take away the needles to make the knots; and ordering an assistant to bring the lips of the wound together, I fasten the stitches one after another, beginning at the middle one if there are three, and at the uppermost if there are but two. I then make the surgeon's knot, and afterwards a slip or bow knot, that we may loosen the suture should it become too tight by the tension of the belly. These knots should be made at the least depending part, that they may be secured, as much as possible, from any moisture which may discharge from the wound. I then moisten the knots with oil, or pomatum, and lay over the wound a bit of linen spread with some glutinous balsam, observing all the precautions mentioned in the article of sutures. Having afterwards covered the whole with sufficient

cient compresses, I next apply an uniting bandage made with a napkin, which is to be so placed as to go round the body, and have its two ends brought to meet on one side of the wound.

I do not offer to direct any particular situation for the patient, well knowing that the most commodious will grow insupportable in time; but leave him at liberty to choose sometimes one, sometimes another, taking care only not to lie upon the belly. But, in order thus to change his posture, it is of great consequence, that he does not at all endeavour to help himself; for the muscles of the *abdomen* contracting themselves upon the least effort, would strain the stitches of the suture, which might inflame the lips of the wound. The patient therefore should be moved by some other persons, who are strong and handy.

WE must leave it to nature, to direct us when to take away the ligature and the stitches. The ligature of the *epiploon* should bring with it that part of the *epiploon* which it has separated from the quick, and this cannot all come off but by suppuration; we must now and then examine, therefore, by pulling the thread a little, to see whether it grows loose. Sometimes it happens, that this ligature loosens by the shriveling of that part of the *epiploon* which it encompassed, and falls off before the suppuration has quite divided it from the sound part.

As to the stitches made in the wound of the teguments, they must remain till we find the skin perfectly closed; and then they are to be drawn away, as has been before directed in the general article of sutures.

WHEN the skin is cicatrized, the suture made in the intestine may be removed without danger; and in order to do this easily, the threads should be

be untwisted and then cut off close to the cicatrix, on one side only; after which, each thread is to be drawn away separately.

THOUGH the stitches made in the teguments pass through and include the *peritonæum*, as well as the muscles and the skin, we may be assured the re-union is not formed in that as it is in the other parts; for whatever care is taken to bring together the lips of a wound in the membranes, and to keep them so, they never unite together: thus the *peritonæum*, in wounds of the *abdomen*, unites and cicatrizes only with the fleshy fibres of the abdominal muscles, to which it is joined by a very thin cellular substance; whence it sometimes happens, that this part is afterwards subject to a *hernia*.

IT now remains to answer the third intention of cure; namely, either to prevent or remove the symptoms that attend large wounds.

To this end, we must keep the patient to an exact and strict diet, especially if the ligature be made on the intestine; allowing him but just sufficient nourishment to moisten the stomach and intestines; and what he does take should be liquid, that it may soon digest and pass into the blood, before it reaches that part of the intestine where the suture is made.

THE patient should be bled according as his strength will bear, and the degree of the symptoms shall direct; and emollient clysters should be given, if necessary, except the *colon* was wounded, and the suture is made in that.

To conclude, emollient fomentations and embrocations of the belly ought not to be omitted; the intent of all being to prevent, or allay the inflammation,

flammation, which, as I hinted before, might occasion a thousand other disorders.

Of HERNIÆ in general.

EVERY tumor formed by any of the soft parts out of their natural situation, is called an *hernia*; but, at present, I shall only treat of those in the *abdomen*.

HERNIÆ may be formed in several parts of the belly, and these assume different names according to the places where they are situated. Thus those in the groin are termed *herniæ inguinales*; those in the bend of the thigh *herniæ crurales*; those at the navel, and along the *linea alba*, are called *exomphalæ*; and in any other part of the belly, *herniæ ventrales*.

Of the *Hernia Inguinalis*.

THE *Hernia inguinalis* is so called, because it appears in both sexes at the groin.

IN these *herniæ* the parts displaced pass out of the belly through the ring, that is, the arch formed by the *aponeurosis* of the *musculus obliquus externus* in the groin, for the passage of the spermatic vessels in men, and the round ligament in women.

DIFFERENCES. The parts displaced that form the *hernia*, the part into which they fall, the manner of the *hernia's* being produced, and the time it has continued, occasion great differences in this disorder.

THERE

THERE are three different parts that may produce a *hernia* in the groin, viz. one or more of the intestines, the *epiploon*, and the bladder. That which is formed by one or more of the intestines, the ancients have termed *enterocele*. The intestine which most frequently produces the *hernia*, is the *ilium*, because, being placed in the iliac region, it is nearer the groin than the rest; but notwithstanding the situation of the other intestines, which seems not to allow of their coming near the groin; we often find the *jejunum*, and frequently also a portion of the *colon* and *cæcum* included in the *hernia*. It may be asked perhaps, how these parts, which are in some measure fixed by the *mesentery*, or by the *mesocolon*, can be found in the *hernia inguinalis*? The answer to this is easy: the *mesentery* and *mesocolon* are membranous substances, capable of extension; it is no wonder therefore, that by little and little they are so far stretched by the weight of the intestines, that they cannot any longer sustain them. The *hernia* made by the *epiploon*, is termed *epiplocele*; as that caused by the *epiploon* and one of the intestines together, is called *entero-epiplocele*. The *hernia* of the bladder may be named *cystiocele*. This latter case is uncommon, and has seldom been known to happen, but in conjunction with some of the *viscera* before-mentioned.

WHEN the parts, having passed through the abdominal rings, descend no lower than the groin, it is called an incomplete *hernia*; when they fall into the *scrotum* in men, or into the *labia pudendi* in women, it is then termed complete.

THE authors who have treated of *herniæ*, have ascribed them either to a dilatation, or a rupture.

Finding some were produced gradually, without pain, or preceding violence, they have looked upon such as proceeding from dilatation, that is, by a relaxation of the parts. Those which happened suddenly from a violent strain, they looked upon as arising from a rupture, believing there was then some laceration both in the parts that support the intestines, and in the *peritonæum* which closes the ring. It appears, however, by an exact examination into these diseases, that there is no laceration, but always a greater or less extension; that is, the parts only stretch and give way; namely, the *mesentery*, the *mesocolon*, the *peritonæum*, and the *aponeurosis* of the *musculus obliquus externus*, whose ring being forcibly distended, leaves a passage for those *viscera*, that present themselves, to come out. This I shall explain more at large in my account of the different causes of *herniæ*; and for the future shall omit the use of the term *rupture*, as being improper.

To conclude, there are some *herniæ*, which are recent, and others of long standing. Of the latter, some have never been reduced, others being reduced have been kept up by a truss for a considerable time, and have fallen down afterwards; in others again, the parts have frequently descended into the hernial sac, and have as often been reduced, and for some time kept up. We shall hereafter see, that all these differences are material, both with regard to the symptoms attending each of them, and the manner of treating them.

CAUSES. An *hernia* may arise from an external cause, having been often known to proceed from a kick in the groin: by which accident, the

the *aponeurosis* that forms the ring being deprived of its power of contraction, some of the abdominal contents, either from their weight, or some subsequent strain, have passed out of the cavity through this ring. But the most common cause of *herniæ* is internal, as from the quality of the nutritive juices, from the size and weight of the *viscera*, and from the muscles of the abdomen acting jointly with the diaphragm to lessen this cavity, as happens in every effort we make.

EXPERIENCE teaches us, that the quality of the fluids may dispose the parts to an *hernia*, since it is observable, persons, who use much butter or oil in their food, are almost all subject to this distemper, which is the reason of its being so common amongst those who live in convents. Undoubtedly their nutritive lymph, being too much impregnated with oily particles, does not furnish the solids with sufficient strength; whence it follows, that the *peritonæum*, becoming too lax in such persons, easily distends. Thus the *mesentery* and *mesocolon* yield to the weight of the intestines, and the arch of the *colon* to the weight of the *epiploon*. The ring likewise, having little elasticity, readily gives way to the impulse of these parts which press upon it. Very fat people are almost in the same case; the bulk and weight of the *epiploon*, which is sometimes four fingers breadth in thickness, occasions it to press upon the rings, and dilates them so as to work itself a passage. Old people, upon their recovering from sickness, are also very subject to *herniæ*, from the loose texture of their fibres at that time. These are all the sorts of this distemper ascribed by authors to dilatation.

It happens at other times, that without the part being disposed to a relaxation, the forcible

and sudden action of the *diaphragm*, and the muscles of the *abdomen* will occasion an *hernia*. When all these muscles act conjointly, as in straining, they diminish the cavity of the belly in proportion as they contract themselves, and the parts contained therein are compressed; it is no wonder therefore, that the *viscera*, under such circumstances, force themselves a passage where they find the least resistance. It is this sort of *hernia* which authors pretend is made by rupture, though in reality there is no such thing.

THE disposition of the *diaphragm*, and of the different coverings of the abdomen, is what inclines the *hernia* to be formed rather in one place than another; but as I shall only treat at present of the *hernia inguinalis*, let us see why it happens there.

IN the groin, the *viscera* meet with no other resistance than from the expansion of the *peritonæum*, which forms a sort of curtain before the ring. The *peritonæum*, which is but weak, gives way to the impulse and weight of the intestines before-mentioned; it yields, stretches, and is forced even into the *tunica vaginalis*, where it forms a kind of pouch, or bag. This membranous bag is what they call the *sacculus hernialis*, which stretches more or less, according to the bulk of the parts that fill it, and forms a perfect or imperfect *hernia*.

THE manner in which the *hernia* was formed, with the care that has been taken of it, and the time of its continuance, produce great alterations in the ring, the *sacculus hernialis*, and even in the parts that form the *hernia*; and these alterations are very necessary to be known.

IN

IN an *hernia* formed gradually, that is, by relaxation, if it is of long standing, and no care has been taken to keep it reduced, the ring and entrance of the *sacculus hernialis* are greatly dilated; the *sacculus* itself is grown thick, sometimes one third of an inch in thickness, and the parts affected by the *hernia* are more and more extended. Thus the *mesentery* and *mesocolon* have been elongated, and their extension become so habitual, that they could not easily contract again. The arch of the *colon* has often changed its natural situation, being drawn downwards by the weight of the *epiploon*. In this case, we frequently see the parts that are contained in the *sacculus hernialis* become strongly adherent, either one to another, or to the internal surface of the hernial sac.

IF care has been taken to keep the *hernia* always reduced, the entrance, or mouth, of the *sacculus hernialis*, and the ring, have again contracted themselves in some measure, and recovered their tone; but nevertheless they are continually ready to give way to the weight of the *viscera*, which will press upon them on the least strain. In this case, the *sacculus hernialis* is very little thickened, neither are the *mesentery* and the *mesocolon* elongated, as in the former instance.

To conclude, if the *hernia* has been sometimes kept up by bandage, at other times been subject to the pressure of the *viscera*, the ring and *sacculus hernialis* are greatly dilated, the *sacculus* become very thick, and the *mesentery*, as well as the *mesocolon*, very much elongated, so that the intestines and the *epiploon* always bear upon the ring, and are ready to force their way through, on the least impulse, notwithstanding the bandage; nay, even

without any force, if the bandage happens to be any way out of its place.

IN an *hernia* formed suddenly and by a forcible extension, if it has not been attended with any considerable symptoms, which is a very uncommon case, and if, after its being reduced, care has not been taken to keep it so, the same circumstances will occur as in the *hernia* formed by dilatation; for the ring loses its contraction more and more, and gradually dilates, as well as the mouth of the *sacculus hernialis*. The *sacculus* likewise grows thicker in time; and all the intestines and the *epiploon* may gradually fall into it, by the extension of their ligaments. But, if, on the contrary, it has always been kept reduced by a bandage, the ring will contract, the mouth of the *sacculus* becomes less without closing entirely, and recovers its tone. The *sacculus* itself remains small, and but a little thickened, and the *mesentery*, as well as the *mesocolon*, which had only given way to the extension of the parts whilst they continued in the sac, recover their spring upon the reduction being made.

To conclude, if this *hernia* is recent, and attended with a strangulation, the ring, which is only weakened in its spring, will still retain a considerable elasticity; but the mouth of the *sacculus hernialis*, which is always thin, becomes relaxed; and if the strangulation has continued some days, it may have occasioned an inflammation, with adhesions, though but slight; that is, the circumvolutions of the intestines are become adherent either one to another, to the *epiploon*, or to the *sacculus hernialis*, within the circumference of the ring, and in the belly round about the ring. The *epiploon* may have become adherent to the parts which
it

it comes in contact with, as well as the intestine : a gangrene may be the consequence of the inflammation, and may be more or less advanced : all which circumstances should be duly attended to, when we are to consider of the proper method of treating these disorders.

SIGNS. Two circumstances enable us to discover *hernia*, and to distinguish them from humoural tumors ; viz. the touch, and the symptoms which attend them.

HUMOURAL tumors are perfectly hard when they are not disposed to suppurate ; and when they are, have an cedematous soft feel, or else a manifest fluctuation in them. But the *hernia* are never perfectly hard, and the softness they have is neither equal in every part, nor does it resemble those tumors, where there is an extravasation of some of the fluids. For though there may be a fluid in some *hernia*, the fluctuation is only to be felt in one single place, and the rest of the tumor is unequal ; whereas the fluctuation in an humoural swelling may be felt throughout great part of it, especially in the middle. Besides, a humoural tumor is not formed on a sudden, like an *hernia*.

It is not sufficient, however, for a surgeon to barely distinguish an *hernia* from an humoural tumor, by the feel ; but he must endeavour likewise to discover the different species of *hernia*, that is, to find out, by the touch, what part is inclosed in the *hernia*.

WHEN it is an *epiplocele*, there is nothing to be felt but a doughy softness, which neither absolutely gives way to, nor very sensibly resists, the touch,

If it is an *enterocele*, the swelling is more elevated, tense, and unequal, and yields and answers to the touch : if it is an *entero-epiplocele*, the symptoms are mixed.

THE circumstances accompanying the *hernia*, discover to us still better what parts are prolapsed.

THE *epiplocele*, if formed gradually by relaxation, is neither attended with strangulation, nor any other symptom ; but if it happens on a sudden, and the *epiploon* cannot return again, the tumor may become painful : in which case, as the *epiploon* is connected to the inferior part of the stomach, the patient will feel a kind of dragging or twitching there, and, in consequence thereof, some slight reachings to vomit. The excrements will have a free passage, notwithstanding the connexion of the *epiploon* to the arch of the *colon*, because that, at most, can only draw it a little towards the lower part of the *abdomen*, and this does not at all impede the peristaltic motion which is natural to it.

The *enterocele*, proceeding from relaxation, is in general free from symptoms, as well as the *epiplocele* ; for as the dilatation of the ring of the *obliquus externus* leaves the intestine a free passage for its peristaltic motion, the course of nature is not interrupted nor disturbed. Yet it sometimes happens, that this *hernia* is attended with the same effects, as that which proceeds from a violent strain ; and this may arise from two causes ; the first and most frequent is, the bulk of some indurated excrements filling that part of the intestine which forms the *hernia*. If it be the *colon*, this arises from some *fæculent* matter, which by its lodging there becomes very hard. If it is the
ilium,

ilium, it proceeds from something more liquid, since it still contains a portion of chyle; but what is most fluid passing through the lacteal veins, the excrementitious matter, remaining in that part of the intestine which is in the *sacculus*, acquires a thicker consistence, and forms an obstruction there, which interrupts the free passage between the beginning and end of the intestine. The second cause of the symptoms attending this *hernia* is more uncommon; and this is, an accidental inflammation in the ring, which, lessening its diameter, strangulates more or less that portion of the intestine which has passed. In either of these cases, the matter that ought to go through that channel is suspended; and this interruption in the course of nature (which requires the way to be always free from the entrance of the *pharynx* to the *anus*) produces symptoms, which, though at first but slight, increase gradually, and at last kill the patient, if they are not removed.

THE *enterocele* produced suddenly from a violent and hasty strain, is equally subject to these symptoms; but then they increase much quicker, and succeed one another very fast, because the ring, in that case, retains some of its elasticity. This elasticity always inclines the ring to contract itself, whilst the intestine is continually dilated by the fermentation of the excrements, and the pressure of those which are constantly forced into it.

AN inflammation, which is the natural consequence of the mutual pressure of these parts on each other, and of the distension of the several blood-vessels, soon comes on, and increases the strangulation. The irritation in consequence of this inflammation easily propagates itself along the
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the intestinal canal, and affecting the stomach, excites an inclination to vomit more or less frequent.

Soon after, the pain which the patient feels in the groin, extends all over the belly, and vomitings ensue. At first nothing comes up except bilious matter. But the inflammation seizing upon the whole intestinal canal, nature, who, by the peristaltic motion of the intestines, forwarded the remaining contents, being willing to rid herself of that liquid which cannot follow its usual course, forces it, by an antiperistaltic motion, to re-ascend into the stomach, and to issue thence by vomit. The foetid smell of this discharge makes it imagined that the patient brings up his excrement; but it is proper to observe here, that what the stomach ejects in this case, is not the excrement, as some authors affirm, since that only ought to be called so which remains behind, entirely separated from the chyle, when the digestion is performed, and is lodged in the *colon*. We may add farther, that when part of the *colon* is included in the *hernia*, the excrement which is lodged in that intestine, above the part strangulated, cannot pass back into the *ilium*, because of the valve of the *cæcum*. For this reason, in speaking of the vomiting occasioned by the strangulation, I mentioned nothing of the excrement, except what is found in the intestinal canal. Another symptom which follows soon after, is the suppression of the *feces* by the *anus*. It is true, indeed, the matter that fills the *colon* beneath the part strangulated, has a free passage; but it cannot be excluded at the *anus* without some straining, which in this case the pain will not admit. As the whole nervous system suffers, the pulse becomes

comes low and contracted, and the extremities cold; an ardent thirst ensues, and the tension of the belly still increases. After these symptoms come on, if no remedy is applied, a gangrene succeeds, which puts an end to all, with the life of the patient, in a short time.

THE swelling, which before was elevated, red, and painful, now sinks, turns livid, and is hardly sensible. The tension of the ring being lost, it no longer strangulates the intestine as before, nor opposes its reduction, so that sometimes it returns into the *abdomen* spontaneously. The pain and tension of the belly abate, from the inflammation being turned into a gangrene; to conclude, the vomiting ceases, but is succeeded by a hickup. The coming-on of this last symptom does not strike the by-standers so much as the disappearance of the other symptoms; and I have known persons upon such occasions, who were not well versed in the nature of this disease, triumph as if they had got the better of it; but their joy was of short duration, the patient soon dying by the gangrene spreading over all the cavity.

PROGNOSTIC. In order to direct our prognostic in these cases, the following circumstances are to be taken into consideration, *viz.* the patient's age, the part that forms the *hernia*, the symptoms attending it, and the time of its duration.

In the management of a *hernia* where there is no strangulation, we find by experience that the age of the patient is a circumstance of moment. We may promise a cure in children, and youth, provided care is taken for a considerable time to keep the reduced parts constantly up by a bandage. At this age the dilated ring contracts its
self

self again, and recovers its tone as the patient grows. But we dare not flatter ourselves with hopes of the same success in those who are of a more advanced age; the ring will not then contract itself in the same manner, and after having reduced the parts, it is very difficult to confine them by bandage, since they are always ready to fall down again, either from their own weight, or upon the least strain.

IN a *hernia* complicated with a strangulation, the stronger the patient is, the less can we expect to make the reduction by the operation of the *taxis*; for under that circumstance the ring has more tension, there is greater reason to apprehend an inflammation, and more difficulty in removing it if it supervenes. We may hope, therefore, sooner to succeed with old people, than with young.

THE *hernia epiplocele* without a strangulation, that is, when it has come on gradually, and is easy to be reduced, is not liable to any accident; and therefore ought not to be looked upon as a dangerous disorder. But if care is not taken to keep the *epiploon* reduced, it is almost certain, that in time it will contract adhesions in the *sacculus hernialis*; and as its lodgment there will keep the ring and the mouth of the *sacculus* constantly dilated, the *hernia* may, by admitting the intestine, be changed to an *entero-epiplocele*.

THE *epiplocele* which is formed suddenly, is not always easy to be reduced, if the reduction is at first neglected. For the *epiploon* being a collection of membranous cells, more or less full, the fat in those which are strangulated by the ring, slips away above and below, into the neighbouring cells; and the part that remains in the *sacculus hernialis*, becoming thereby larger than that

which is contained in the ring itself, cannot possibly repass. Supposing the reduction impracticable, on account of the contraction of the ring, that portion of the *epiploon* which is in the *sacculus* may inflame, putrify, and come to matter.

It is easy to conceive, from a knowledge of the intestinal canal, and its use, that the *enteroceles* may be liable to symptoms, to which the *epiplocele*, of what kind soever, cannot be subject; and consequently we may affirm, that every person who has an *enterocoele* is always in danger, if care is not taken to prevent the descent of the parts by a proper bandage; nevertheless there are some *enteroceles* attended with symptoms, which we may hope to reduce by the *taxis* and the assistance of proper remedies, though there are other cases of which we can form no such hopes.

THOSE which we may expect to reduce, are the large complete *herniæ*, where, the ring being very much dilated, a great deal of the intestine is fallen down: and these are attended with symptoms, on account only of the quantity of *feces*, which fill and choak up that part of the intestine which forms the *hernia*. Those where a reduction is not to be expected, are the small imperfect *herniæ*, which contain only a little part of the intestine.

THERE can be no hopes of succeeding in this latter case, for the following reasons, first, because the ring retains all its elasticity; secondly, because it is impossible to handle the parts in order to their reduction; and therefore the patient in all probability must die, unless the operation by incision be speedily performed.

IN the *entero-epiplocele*, the violent symptoms before-mentioned will not happen so immediately as in the *enterocele*, the *epiploon* by its softness securing the intestine from the hardness of the ring, and defending it from any injury it might meet with in the different attempts, sometimes unskilfully made, to reduce it.

FOR this reason we may be less solicitous about performing the operation by incision. I have done it at the end of seven or eight days, and have found the intestine quite sound, though the *epiploon* was gangrened. See my *Observations*, p. 215. But I have tried it at the expiration of but thirty-six hours in *enteroceles*, and have found the intestine gangrened, that alone having sustained the whole compression of the ring, and of the attempts made to reduce it.

TO conclude, the nature and the violence of the symptoms, if they are come to the height, may easily enable a surgeon to form his prognostic, whether it be for his own direction in conducting the cure, or to secure the reputation of the profession from reproach, provided the operation should fail of success. If the symptoms are very violent, there is all the reason imaginable to apprehend that, on performing the operation, the intestine will be found gangrened, and perhaps open in the *sacculus hernialis*; nor can the life of the patient be warranted from the performance of the operation, not only on account of the gangrene which has seized on the strangulated part of the intestine, but also from the inflammation, which probably has already reached the whole intestinal canal, and which it is very difficult to remove. I have often seen this whole canal inflamed, and marked in
several

several places with gangrenous spots. See my *Observations*, p. 134.

I HAVE seen others; where part of the *mesentery* being inflamed had acquired twice its natural thickness. See my *Observations*, p. 196.

IN short, if we find that all the symptoms suddenly cease, the tumor subsides from a mortification being begun, and the intestine returning into the *abdomen* spontaneously, the death of the patient is inevitable.

ANOTHER circumstance to direct our prognostic, is the duration of the *hernia*. We may venture to pronounce, that an old *hernia*, where care has not been taken to keep it reduced, but the prolapsed parts have contracted a habit of coming out and returning in easily, will never be cured. However, to make some amends for this, the largeness of the ring, and of the mouth of the *sacculus*, free the patient from the fear of any strangulation happening, unless the *feces* should stop there and obstruct the passage.

As to the *hernia* which has been of long standing, and where sufficient care has been taken to keep the parts constantly reduced by a good bandage; if, in consequence of some strain, a descent should happen, such an *hernia* is generally attended with strangulation; and the reduction is more difficult to be made, as the contraction of the ring is strengthened by that of the entrance of the *sacculus hernialis*, which, as has been already observed, is become very strait, by the habit it has acquired of contracting itself. See my *Observations*, p. 197.

CURE. The cure of an *hernia* consists in returning the parts into their natural situation, the *abdomen*; and in preventing their coming out again.

In order to answer these intentions, we generally have recourse to diet, surgery, and pharmacy.

I HAVE hitherto considered *herniæ*, either as being easily reduced from the largeness of the ring, or as not admitting a reduction; the want of which will necessarily be productive of many troublesome symptoms. We must therefore consider each in its proper light, in order to determine how they are to be treated.

IN respect to such as are easily reduced, as they generally proceed from the quality of the fluids, too much impregnated with oily, and destitute of those spiritous, particles which are requisite to furnish the parts with their proper elasticity, the assistance of diet and pharmacy can here be of no service. Art can supply no remedy capable of changing constitutions; nor is there any such thing as restoring the elasticity of the ring, when by its lax texture it has frequently suffered the parts to prolapse. It is true indeed, some persons have been known to undertake the cure of *herniæ* by astringents or styptics taken internally; others by the application of restraining cataplasms and plasters, with a design to contract the dilated ring and restore its tone; but the unsuccessfulness of these remedies, which, if they had answered the purpose, would be now in credit and known to every body, is a proof of their inefficacy. Others again have proposed making an eschar with a caustic upon the mouth of the hernial sac, in order that the cicatrix might supply the use of the ring and strengthen the passage; but if this caustic penetrates no farther than to the *sacculus*, without cauterizing it, the stricture of the cicatrix would be but an indifferent expedient to compress the mouth of the *sacculus*, instead of the bolster of a truss; especially

ally as this cicatrix will in time grow soft; and if the caustic penetrates to the entrance of the *sacculus*, and destroys that, the seminal vessels which adhere to it will consequently be destroyed at the same time, and the patient be thereby deprived of the use of one testicle.

THE only remaining remedy then is that which surgery affords, and this is to be effected, first, by reducing the prolapsed parts; secondly, by applying a well-made truss, the bolster of which pressing constantly upon the ring, stops up the passage, and supports the intestines, or the *epiploon*, which are always ready to fall down again into the *sacculus hernialis*.

SOMETIMES the reduction is easy to be made, at others not; and the occasion of this difference arises from the various species of *herniæ*.

I HAVE seen instances where the ring and mouth of the *sacculus hernialis* were so much dilated, that the parts passed out, or re entered of themselves, according to the posture of the patient. The difficulty then does not consist in reducing these *herniæ*, but in keeping them reduced without fatiguing the patient by the use of a truss, which, though well made, is almost insupportable, as it must remain on very firm and tight. I have sometimes known these patients, upon being attacked with an habitual cough, have been obliged to leave off the use of the truss, and content themselves with a suspensory.

THERE are others, where the ring and mouth of the *sacculus* are very much dilated, and yet the parts cannot be reduced; either because they have contracted adhesions in the sac, or because the greatest part of the intestinal canal and the *epi-*

ploon remain there, instead of the belly, and nature performs its functions equally as before.

IN the first case, where there is an adhesion of the parts to the *sacculus*, there is no reduction to be made; they must continue as they are. In the second it may be asked, whether it is possible to reduce almost the whole intestinal canal after it has been long lodged in the sac, and whether, supposing it possible, it would be prudent to attempt it.

As to the possibility, every one is not agreed, on account of the disproportion between the diameter of the ring, however large it be, and the bulk of the parts, which form a sort of lump in the sac. It is added, that, supposing the reduction easy, it is impossible to prevent the parts from slipping down again, because the *mesentery* and the *mesocolon*, having suffered so long an extension, are incapable of supporting the intestines and the *epiploon*, which on account of their weight cannot be kept up by the bolster of the truss. Neither is it agreed, that it is right to reduce the parts and to keep them so, allowing it to be practicable; since, after being reduced, they would be too much compressed in the belly by the skin, the muscles, and the *peritonæum*, which must have contracted themselves in proportion to the small bulk of those viscera they had to contain: and this pressure, it is thought, joined to the change in the situation of the parts, would occasion an obstruction of their vessels, and consequently an inflammation.

IN this case, therefore, experience ought to determine, and to be admitted as preferable to the most plausible arguments. I have seen the late *Monf. Arnaud* reduce several of these *herniæ*, of
long

long standing, and keep them so; and I have known the patients live many years afterwards in good health, and free from those accidents that might have been apprehended. The reason of this success was, that the precautions he took to facilitate the reduction, conduced also to the preserving them from those accidents that might have happened after the reduction was made. These precautions consist in confining the patient for a fortnight, or three weeks, to his bed; during which time, he is to live entirely upon soup and broths, and even of those in such a quantity as only to prevent inanition. It would be proper, likewise, he should be bled three or four times, according to the fulness of his constitution, and to have his body kept open by gentle purgatives: by these means his strength being diminished, the parts become more pliable; and the whole body being emaciated, the size of the *mesentery* and the *epiploon* is likewise lessened, whose bulk was the principal obstacle to the reduction. It is then more easy to replace the parts in their natural situation; which being once done, there is no great difficulty to keep them there. To this end a truss must be applied, and the patient confined to his bed at least a fortnight longer, that the *mesentery* and *mesocolon*, which had suffered an extension, may contract themselves as much as possible, and recover their former strength; which they will do in that time.

THERE are still some other *herniæ*, the reduction of which is very difficult, though the ring and the mouth of the *sacculus hernialis* are not much contracted; and these are such as I before observed, where the *fæces* are grown hard in that part of the intestine which lies in the *sacculus*, and obstructs the

passage of the other excrements, that ought to have a free course through the canal. This also sometimes happens in those *herniæ* where care has been taken to keep them generally reduced, but which have sometimes been suffered to come down; for in this case, the ring and the mouth of the *sacculus hernialis* are contracted only to a certain degree.

To conclude, there are other *herniæ*, where the reduction is still more difficult; for instance, when the ring and the mouth of the *sacculus*, being greatly contracted and inflamed, strangulate the parts that form the *hernia*, so as to bring on a gangrene, if not speedily reduced.

WHETHER this reduction be more or less difficult to be performed, it may be undertaken by two operations; the one called *taxis*, and the other *bubonocèle*; the last of which bears the name of the disorder for which it is practised.

Of the operation of the Taxis.

THE *taxis* is an operation, by which those parts which have quitted their natural situation are replaced by the hand, without the assistance of instruments.

IN order to execute this properly in the case of an *hernia*, I direct the patient to lie upon his back, with his buttocks and legs raised as high as possible, and the breast a little elevated, that the muscles of the *abdomen* may not be upon the stretch, and that there may be a descent from the ring to the cavity of the belly.

THE patient being thus placed, I caution him not to use the least strain, that he may not force the intestines towards the *hernia*; and I order a
skilful

skilful assistant to hold up the *scrotum*. If it is an *enterocele*, I place two or three fingers exactly underneath the ring, and grasp the swelling at its neck; then gently pressing the whole tumor with the other hand, I endeavour to soften and spread the indurated excrement lying in the intestines; for it is oftentimes, as we before observed, the hardness and form of that matter which are the principal obstacles to the reduction. Authors propose to draw more of the intestine out of the *abdomen* into the *sacculus*, that the excrement being extended in a larger space, may take up less room in proportion to the quantity of intestine that contains it; but this I know by experience to be impracticable. If we are fortunate enough to be able to move part of the softened excrement into the belly, the intestine will not be long before it follows. I have frequently found, after having returned some part of the intestine, that I could not reduce the rest till I had made the patient lie on the opposite side to the *hernia*; and upon so doing, the weight of the intestines has frequently been sufficient to draw the remainder into the belly.

THE intestine being replaced, I next try to reduce the *epiploon*; which, provided it is not of too large a size, or has not contracted any adhesions in the *sacculus*, passes in easily.

THE reduction being made, our next concern is to keep up the parts reduced; and the securest method of doing this is, by the application of a truss. This truss should be made to press upon the ring in order to close the passage; and care should be taken that it be well finished, and applied so that it does not incommode the patient. I look upon this application, however, as a mere

palliative remedy, in persons arrived to a certain age; though in infants and young people, the constant application of a well-made bandage has often been known to produce a perfect cure, by allowing the ring a sufficient time to contract itself. The truss, I observed, must be kept on constantly; for, should the parts descend again into the *sacculus hernialis*, it would very much retard the progress of the cure.

FROM what I have just now advanced, it may be inferred, that the application of a truss is not proper, till after the reduction of the *hernia*; but there is no general rule without an exception, as in this case; for in some imperfect *epiploceles* that were not reducible, a truss has been frequently made use of successfully. Upon such occasions a well-made truss, whose bolster is hollowed, and adapted to the swelling, gently presses upon the *epiploon*, and not only prevents it from slipping out farther, but by compressing the *vesiculæ adiposæ* hinders the oleaginous particles from entering them, and thereby obliges that part of the *epiploon* to collapse. But this method will be of no service in any *hernia* where the *epiploon* is fallen into the *scrotum*.

I PROCEED now to speak of those *herniæ*, which are attended with the symptoms beforementioned; in which cases the assistance both of diet and medicine must be jointly employed, to deprive the ring of that elastic power which hinders the reduction.

THE regimen consists of a proper diet, and necessary evacuations. As to the former, the communications between the *pharynx* and the *anus* is not open; and so far are the contents of the stomach from passing through the intestines, that all
that

that is in the intestinal canal re-ascends, and forces its way out by vomit. As soon, therefore, as there is no hope of any aliment passing into the blood, we must allow the patient only a very small quantity of liquids, just sufficient to moisten the *œsophagus* and stomach; for whatever is given beyond that quantity, would excite or increase the reaching, and every strain would certainly tend to aggravate the disorder.

NOTWITHSTANDING the patient cannot receive any nourishment, yet the use of bleeding frequently repeated, is not on that account less necessary; for, by emptying the vessels of the body in general, we likewise empty those that have communication with the part affected, and thereby may not only stop the increase of the inflammation, but may also abate it. As by this means we weaken the whole body, we likewise relax the contraction of the *aponeurosis* that forms the ring; and how often has the reduction been successfully made by the *taxis*, during the continuation of a swoon from bleeding?

At the same time that we use venesection, we ought to apply proper topics upon the tumor, and especially upon the ring, such as emollient cataplasms. These, by their unctuousness, soften the texture of the parts, and by their warmth quicken the motion of the fluids, which are become stagnant there. Of the several cataplasms that have been recommended upon this occasion, that which I have found most successful, is made with the pulp of emollient herbs, wherein a sufficient quantity of ointment of marsh-mallows has been dissolved. Care must be taken to renew these cataplasms, that they may not grow hard or dry.

To conclude, we attempt the reduction of these *herniæ*, either by the *taxis* beforementioned, or by the operation of the *bubonocèle*. The *taxis* is improper if the swelling be attended with inflammation, at least to any degree: for whilst it is inflamed and painful, we may be sure the strangulation still subsists, and it would be in vain to endeavour at the reduction by this operation, which would only serve to increase the disease. When these symptoms are moderate, we may try, every time the cataplasm is changed, to reduce the parts, taking care however not to injure them by too much handling. I have already directed the proper method of doing this; therefore, I shall now pass on to those *herniæ* which cannot be reduced but by the operation with incision, termed *bubonocèle*.

Of the operation called Bubonocèle.

It sometimes happens, that the *hernia epiplocele* cannot be reduced, and the *epiploon*, being strangulated by the ring, inflames, suppurates, and forms a kind of simple abscess, the fluctuation of matter being perceptible under the finger. Upon opening this, we find amongst the *pus* some clots or lumps, which are portions of the *epiploon* separated from the rest by the suppuration.

In *enteroceles*, which cannot be reduced by the *taxis*, a suppuration, or rather a gangrene, is then what is most to be apprehended: upon this account we cannot too soon have recourse to the operation, by opening the *sacculus hernialis* and making an incision in the ring to dilate it, the contraction of that being an obstacle to the reduction.

It

IT is very difficult to determine here, what is the proper time for performing this operation; and the difficulty arises from the difference that there is in *herniæ*. If, for instance, there is a descent of an intestine only, there is no time to be lost, in order to prevent a gangrene. I have seen, in an *enterocèle*, the intestine gangrened and intirely black, in forty-eight hours after its strangulation; for the ring, being but slightly dilated, preserved its elastic power and pressed directly upon the intestine. This does not happen when the intestine is accompanied with the *epiploon*; the softness of that securing the intestine.

IN those *herniæ* where the ring is not either contracted or inflamed, and where the symptoms are produced only by the grossness of the excrements, the operation may be delayed; because the symptoms are moderate, and most commonly the intestine is successfully reduced in a few days. I have reduced several at the end of seven or eight; but the judgment of the surgeon is to direct him in this respect, according to the circumstances of the case. That is, he is to consider the patient's age, the nature of the tumor, the manner in which it was formed, its size, and the degree of the symptoms: that he may be able to judge whether by delaying the operation there may be any danger of a gangrene. It is true, I have known patients cured who have had the intestine gangrened; but these cures will not justify us in exposing a patient to such hazard: they are at most but a proof that an intestine may gangrene, and the patient escape; yet it is nevertheless an accident that ought to be avoided. Add to this, that since none but the teguments are cut, the operation is not at all dangerous

dangerous of itself; and it is certainly better to do it rather too soon, than to neglect it till it is some hours too late.

THE diet, to which the patient has been confined from the beginning of the symptoms, and the blood he has lost to abate the inflammation, will serve as a proper preparation; therefore, all trials to reduce it having proved unsuccessful, our only business is to proceed to the operation.

THE instruments and dressings being got ready, the parts must be shaved, and the patient placed upon his back in the same manner as in making the reduction by the *taxis*.

IF, by the great tension of the skin, it cannot be taken up with the fingers, I make a longitudinal incision in the middle of the tumour, with a straight bistory, into the *membrana adiposa*: if it can be taken up I do it with the help of an assistant, and with a straight *bistory* divide all that is pinched up between the fingers, directing the incision so, that it reaches from the ring to the *scrotum*. Then guiding the *bistory* by a director, I enlarge the incision as far as an inch above the ring, and as much below the swelling. When the *hernia* is complete, this incision extends to the extremity of the *scrotum*. I afterwards divide all the membranous parts as far as to the *sacculus hernialis*, either by tearing them, or cutting them with a *bistory*, conducted along the director. It sometimes happens that a considerable large vein is situated under the skin, which we cannot avoid cutting as it lies just before the *hernia*; but first, it would be proper to make a couple of ligatures upon it, that the discharge of blood may not prevent our proceeding safely in the operation.

WHEN

WHEN the *hernia* is recent, we cannot go on too cautiously till we discover the *sacculus hernialis*; for as this is very thin, we might happen accidentally to open it, and at the same wound the intestine: but in an old *hernia*, the *sacculus* is very thick, and there is the less danger of being mistaken. In the first case, when the *hernia* is recent, the *sacculus* forms a kind of long bag, of a very thin texture; and was not the colour of it of a paler cast, and its surface not so smooth as that of the intestine, we might be apt to imagine we had got to the intestine. In *herniæ* of long standing, the hardness of the *sacculus* and its paler colour will prevent our being deceived in this particular. The *sacculus* being discovered, I lay hold of it, if possible with my fingers, being very careful not to take up any other part besides, and with the point of my scissors I make an opening sufficient to introduce the director. If I cannot get hold of it, as may happen to be the case when the *sacculus* is grown hard and thick, I gradually introduce a director, almost sharp pointed, between the *laminae* which compose it, till it penetrates into its cavity, and dividing the different *laminae* one after another with the bistory, I thin it by little and little, and at last open it. I am certain of having got through the sac, if, as it generally happens, there is a small discharge of water. After this, with the assistance of a probe, I open the *sacculus hernialis* as far as its upper part, and introducing my finger within side to the lower part, guide my scissors upon that, and finish the incision.

I HAVE seen instances of *entero-epiploceles*, where, after making an incision into the *sacculus hernialis*, I have found that the *epiploon* formed a
sort

fort of bag that inclosed the intestine, which bag must be opened, in order to get at the intestine. We may distinguish it by the smoothness of its surface, by its colour and a small quantity of *mucus* that covers it; likewise when it has received any hurt, there exhales from it sometimes a sort of cadaverous smell.

If we discover with the finger, that the *sacculus hernialis* is not opened as high as the ring, we must finish the incision by the direction of the finger, before we think of dilating the ring; nor should we dilate it at all, unless there is a necessity; and therefore, before we attempt it, we should endeavour to make the reduction. To this end I draw the intestine towards me, in order to get a little more of it out of the belly than what was lodged in the *sacculus*; and pressing it gently to spread its contents, I endeavour to reduce it. If this cannot be effected, the ring must be dilated, for which purpose I introduce the director through the mouth of the *sacculus hernialis*, along the intestine, into the belly; then pressing the groove of the director against the forepart of the *sacculus*, I move it a little, to prevent intangling the intestine between that and the sac. This done, I hold the probe in such a manner that the back of my fingers covers the intestine, when sliding a straight bistory into the groove, I carry that and the director along together, as if they were but one instrument. By this means, I make at once an incision of about one third of an inch in the mouth of the *sacculus*, and in the ring; after which, I draw away both the instruments together. This incision may be performed with much more ease and expedition, and without any danger, with the new *hernial bistory*,

bistory, described and represented in the second part of my treatise of *Observations*. If the old *hernial bistory* is used, we must take care, in drawing it away, to raise up the handle, that we may avoid hurting the intestine, which may happen to come in the way of the edge of the blade. But this precaution is quite unnecessary in the management of my *bistory*; as in cutting with that we need only press the thumb upon the part which moves the blade out. Some surgeons, in making the dilatation of the ring, use a very sharp *bistory*, whose point is guarded with a button, and passing it along between the mouth of the *sacculus* and the intestine, so that the back is to the latter, they open the ring; and they imagine by this means they cannot wound the intestine; but I own, for my part, I cannot believe this, neither would I advise any one to follow this method. Others have recourse to a straight and very blunt-pointed *bistory*, the edge of which is made like a file, and they use it in the same manner, being assured that, in this way, they shall cut the ring without fear of wounding the intestine. This indeed is preferable to the other method of making the dilatation, but must necessarily be very painful, as it is rather a laceration than an incision.

SOME authors caution us, when we are dilating the ring, to avoid cutting the epigastric artery; which is an accident not much to be apprehended, as it lies behind the *hernia*. It is not, however, absolutely without exception, since I have seen, though but once only, the spermatic chord situated anteriorly upon the *hernial sac*. If in dilating the ring we had opened any considerable branch of an artery (for the situation of the vessels, we know, often varies) the intestine must be first re-
duced

duced as will be hereafter directed, then the hæmorrhage must be stopt, and when that is secured, the dressings are to be applied. The tent which authors have proposed to be put into the ring in order to stop the blood, is not a sure method, and it might happen to slip into and be lost in the cavity of the *abdomen*. It is better, therefore, to fix a narrow compress, five or six inches long, upon the fore-finger, and dipping it in alum-water, lay it upon the opened artery, and hold it there with the finger about half a quarter of an hour; and then withdrawing the finger, leave the compress secured upon the part by a threaded dossil. The mouth of the *sacculus hernialis* and the ring, being dilated or cut open, we introduce the end of the finger, to examine into the dilatation, and enlarge it a little more if necessary.

THOUGH the dilatation be made, there may be a difficulty of returning the intestine, by its adhering to the *peritonæum* within the cavity at the circumference of the ring. A like adhesion may be found throughout the internal surface of the *sacculus*. If this adhesion has been of long standing, as is sometimes the case in old *herniæ*, where care has not been taken to keep them reduced, it will not separate, nor can it be attempted without running the hazard of injuring the intestine; upon such an occasion, therefore, it will be more prudent to leave the intestine unreduced as it is, without endeavouring to destroy its adhesions; especially as they are become habitual: It would be necessary, however, to dilate the ring a little more, in order that, as it contracts itself, which it will do as the wound cicatrizes, there may still remain such a sufficient opening, that the intestine
may

may not suffer a compression. But if these adhesions are newly formed, such as those which are caused by an inflammation, they are easily separated with the finger.

SUPPOSING there are no adhesions, or at most such as are slight, and may be easily separated by the finger; if the intestine is sound, it must be reduced immediately. The manner of doing this is by pushing in the intestine with the two fore-fingers alternately, putting in that part of it first which came out last, and taking care not to bruise it. It has been sometimes found very difficult to perform this reduction on fat people, though a sufficient dilatation had been made, the intestine forcing out again as fast as it was put in; nor could it have been done at last successfully, without placing the patient in such a position as to have his breast lie much lower than his belly.

BUT in some cases the intestine may happen to be affected, and the diseases of that may make the reduction improper.

If it is only inflamed, it must be speedily reduced, the natural heat and moisture of the parts being preferable to any topic that can be applied. If by accident it has been opened in performing the operation, but has not contracted by the inflammation any adhesion above the ring, which might fix it there, the looped future must be made, as was described in the article of the *gastroraphy*; and though the reduction may be then undertaken, it would be more prudent not to do it till the next day, that it may appear whether the excrements which are in the intestines above the part that was strangulated, will discharge themselves in the natural way, or through the wound.

If the intestine is found so much changed in colour as to threaten an approaching mortification, we must not think of reducing it, whether it has contracted any adhesions internally with the ring, or not.

AGAIN, the intestine may be really gangrened, and this gangrene may be more or less spread. If it is only a black spot, the reduction should be deferred, for this will fall off in a few days by suppuration, and the intestine will then be open: upon this account, therefore, the intestine ought to be left out; and if it does not adhere to the inside of the ring, we must pass a double thread about it, in the shape of a loop, to prevent its returning of its own accord into the belly, as it would otherwise certainly do. If the gangrene has seized on all that portion of the intestine which is protruded, we must cut off the whole gangrened part; and if afterwards the sound parts cannot be re-united by a future, but the patient is so fortunate to escape with his life, the office of the *anus* will be supplied by the groin.

I HAVE insisted here, that the reduction ought never to be made when the intestine is open, gangrened, or in danger of a gangrene; yet I know, as well from my own experience as that of others, that it has been often reduced, though in the condition wherein I forbid it: nor am I ignorant that many patients have discharged their *feces* through the wound for a time, and when the intestine has been healed, the wound in the teguments was soon cured afterwards; but I am as well convinced on the other hand, that many patients have lost their lives from the *feces* being voided into the *abdomen*; and therefore the
method

method I propose is the safest in effecting the cure.

It now remains, if the *epiploon* is found with the intestine, to take care of that. If there is but a small portion of it, and that adheres, it must be left as it is: if there is a larger quantity, and adherent, part must be cut off, and the rest remain without destroying the adhesion. The hæmorrhage which may ensue is inconsiderable, and easily stopped. If there is a small portion of the *epiploon* which is found, and does not adhere, it ought to be reduced: when there is a greater quantity, and that in a sound state, it may either be reduced, or left in the wound, and in two or three days it will return of itself. Probably the *epiploon* in this case is not elongated, but only came out because the *colon*, being drawn down by the weight, has descended below its natural situation. By the horizontal posture, which the patient must be confined to in bed, the *colon* will re-ascend, and by degrees carry the *epiploon* along with it, which will not then be found too long: why therefore should the ligature be made, and the *epiploon* cut? Nature has not formed it in vain, and by this means we should destroy a part that is very useful. But if the *epiploon* is gangrened, it is then a dead substance, which must be separated by a ligature. To this end, it should be drawn out a little further, to make the ligature more conveniently in the sound part, as has been before observed in treating of the *gastroraphy*.

● HAVING thus taken care of the intestine and *epiploon*, the next thing that requires our consideration, is the *sacculus hernialis*. If the *hernia* was complete and of long standing, the *sacculus*, as was said above, is become very thick and hard;

for which reason the greatest part of it should be cut away, only avoiding to wound the spermatic chord which adheres to it. In women, if the *hernia* is attended with no discharge from the reduced parts, the ligature of the *sacculus* must be made as near as possible to the ring: by this means the ring will be found closed, when the ligature falls off, which will prevent a return of the *hernia*. But, in men, this cannot be done, without tying up at the same time the seminal vessels, which are closely united to the sac: we must content ourselves therefore with cutting off as much as we can without wounding those vessels.

THE dressings are to be different, according to the method that has been used in the operation.

IF we have reduced the intestine and the *epiploon* together, or if, upon finding the *epiploon* adherent to the *sacculus*, we have reduced the intestine only, we must place upon the ring a pellet of lint wrapt up in a rag. This pellet must not close it up so exactly, as to prevent the passage of any serous discharge, which may ouze out for several days, especially in such *herniæ* where the *sacculus* has been found loaded with that kind of fluid. The rest of the wound must be dressed with dry lint, proper compresses, and the bandage named *Spica* loosely applied, that it may not irritate the wound.

IF it has been judged proper to leave the intestine out, either on account of its strong adhesions, or of its being opened or gangrened, we must omit the use of the pellet, which would injure the intestine by pressing upon it, and apply only dry lint covered with compresses and a slight bandage.

IT

It is not enough, however, that the operation is performed, unless we remove the symptoms, which having preceded the operation, may still subsist. It is true there is no longer any strangulation, which at first gave occasion to them; but, in this case, the effect does not always cease with the cause. Sometimes part of the intestine has been inflamed, and the *mesentery*, by the distention of its vessels, grown three or four times thicker than it naturally ought to be. We should endeavour to remove this inflammation by bleedings, more or less copious and frequent; by embrocations, and fomentations upon the belly, often renewed; by diet; by clysters, emollient, resolutive, or carminative, according as the symptoms indicate; and by softening drinks, repeated in a greater or less quantity as the vomiting will permit; especially as, by the reduction, the course of the intestinal canal is now open for the free passage of the excrements.

WHEN the intestine is reduced, the distemper then requires no other care as to regimen than what is generally observed in other wounds.

BUT when an intestine is gangrened, and remains unreduced, particular care will be necessary on account either of the gangrene, chyle, or *feces*, which, for some time pass through the wound. In such a case, we should allow the patient but very little nourishment at a time, that the chyle may be received into the blood before it arrives at the opening of the intestine in the wound: by this means we may prevent excoriations, which the discharge from the opened intestine might occasion on the circumference of the wound.

SOMETIMES part of the bladder has been known to pass through the ring, and form a tumor in the *scrotum*, large in proportion to the quantity of urine contained in it : this can only be its *fundus*. The part that occasions the *hernia*, is not contained in a *sacculus bernialis*, because the bladder is situated in the cellular substance of the *peritonæum*; though it may be so, if the *fundus* of the bladder has drawn with it part of the *septum* that covers it in the *pelvis*. In that case the *sacculus* will be found on one side only, and may possibly give occasion to an *enterocele*, or an *epiplocele*. Either of these *herniæ* may also precede that of the bladder.

The *herniæ* of the bladder is distinguished by the softness of the tumor, a frequent inclination to make water, the pain in voiding it, and the disappearance of the tumor when pressed upon. It is not of dangerous consequence, and the method of remedying it is, after having emptied the tumor, to apply a soft truss upon the part.

I SHALL say nothing here of the *hernia* that is supposed to happen through the *foramen ovale*, as it is not a settled point whether such a case can happen.

Of the crural Hernia.

THERE is no other difference between an inguinal and crural *hernia*, but what arises from the places where they are formed. Men are most subject to the former, and women to the latter; proceeding from the figure of the *pelvis*, which is largest in women. In reality, while the *uterus* and the bladder concur by their bulk to force the intestines on each side, the *ossa ilia* being more spread in them, afford larger spaces for the parts
to

to be received on the sides, and to recede from the groin.

IN the crural *hernia*, the parts generally pass out of the *abdomen*, under the *ligamentum Fallopii*, in the space formed by the attachments of this ligament to the *os pubis*. It is owing to the fat which envelopes the crural vessels, that the *viscera* more easily slip down under this ligament, and those vessels are always found behind the *hernia*. The parts extend themselves afterwards more or less under the *aponeurosis* which proceeds from this ligament, and covers the muscles that form the forepart of the thigh.

THE *peritonæum* in its natural state obstructs their passage here, as it does at the ring, but it likewise gives way, as in the inguinal *hernia*, to the pressure of the *viscera*; and being distended, forms a hernial bag of a greater or less size, according to the bulk of the prolapsed parts.

I HAVE before observed that in the inguinal *hernia* the *colon* is often found, and the *cæcum* very seldom: but in the crural *hernia*, the bag of the *cæcum* is frequently seen, with the beginning of the *colon*. As for the rest, what has been said about the inguinal *hernia* agrees also with the crural. The kinds, differences, causes, signs, and symptoms are the same, and are to be treated in the same manner.

BUT let us see what differences there may be in respect to the performing the operation by incision in these two cases. In the inguinal *hernia*, after having divided the skin, we meet with nothing to cut but a cellular membrane, till we come to the *sacculus hernialis*. In the crural, we find the *aponeurosis* abovementioned; whose consistence being more firm than that of the cellular membrane,

might occasion it to be mistaken for the sac itself. In the *inguinal hernia* the epigastric artery passes behind the *hernia* immediately above the entrance of the *sacculus*; in the crural, it passes before it; therefore great care must be taken to avoid opening it in making the dilatation: and in order to do this we must dilate the entrance of the *sacculus hernialis*, and divide the *ligamentum Fallopii*, by making our incision obliquely towards the *linea alba*; and also very small, as the epigastric artery is contiguous.

THE dressings are the same as in the inguinal *hernia*.

Of the Exomphalos.

WE call that an umbilical *hernia*, which happens along the *linea alba*, from the *cartilago ensiformis* to the *symphysis* of the *os pubis*: for though authors, under this head, have only spoken of the *herniæ* which appear at the navel, it is certain they happen in the same manner, the whole length of the *linea alba*, between the two *musculi recti*; nor is this to be wondered at. In every effort or strain that we make, all the muscles of the abdomen contract at the same time; which cannot be done but the *linea alba*, as it is formed by the union of the *aponeuroses* of these muscles, must be drawn on each side, and consequently greatly stretched. By means of this distension it happens, that in many people, the ring of the navel is opened; in others the *aponeurosis* being much distended becomes thinner in some particular place, and at last gives way to the weight of the *viscera*. Whenever any of these tendinous fibres have lost their spring, they yield more and more to distension,

sion, and no longer assisting their neighbouring fibres, these lose their elastic power likewise, and giving way in the same manner, make room for the parts that are fluctuating in the belly; and as soon as the intestine and the *epiploon* have once begun to form an *hernia*, the swelling gradually increases. I have always observed that the *herniæ* at the navel become of a much larger size than those in the *linea alba*; for, in the former, the parts are only covered by the *peritonæum*; which, being single under the skin and fat, forms a kind of herniary cyst: whereas in those along the *linea alba*, they are covered both by the *aponeurosis* that forms the *linea alba*, and by the *peritonæum* that lines the inside of it; and as this kind of herniary cyst is thicker and stronger than the other, it makes a greater resistance against the impulse of the parts, and the *hernia* does not increase so much.

WITHOUT entering into the particulars of the kinds, differences, signs, causes, symptoms, and prognostic of these *herniæ*, I shall here, as I did in the crural, refer to the inguinal *hernia* what relates to them in common, and shall only speak of what is peculiar to each.

It is first observed, that the umbilical *herniæ* are not so frequent either as the inguinal or crural. This, in all probability, is, because in all violent strains, the diaphragm acting jointly with the muscles of the *abdomen*, thereby forces the intestines and *epiploon* downwards.

It is observed likewise, that women with child are particularly subject to this disorder; which undoubtedly proceeds from the largeness of the *uterus*, which bears up the *viscera*, and thereby preventing them from falling to the lower
part

part of the *abdomen*, they work themselves a passage at the navel.

THE contents of this *hernia* are generally the *jejunum*, *colon*, and *epiploon*, together, or separately. If it is the *colon* only, the *epiploon* is not found before this intestine in the *hernia*; but, if the *jejunum*, it is covered by the *epiploon*, which makes a sort of curtain or hood before it, wherein it is inclosed.

It is very seldom known, that umbilical *herniæ* are formed on a sudden, like the inguinal or crural; and we may venture to assert that they are always caused by dilatation. They are at first very small, and increase gradually; and if we are called to a patient who has an umbilical *hernia*, attended with such bad symptoms as proceed from the strangulation of the intestine, we at the same time generally find, that the *hernia* has been of some standing, and has become troublesome but lately.

THE symptoms to which an umbilical *hernia* is subject, being the same as in the inguinal *hernia*, I shall not enlarge upon them; but shall only observe, that I have often known women, both in the time of their pregnancy and at other times, complain of slight but almost continual colics; and upon questioning, or examining them, I have found, they had a small umbilical *hernia*, which they had not at all regarded. It is true, the intestine was not strangulated in these cases; but being intangled at the mouth of the *sacculus* by the angle it made, its peristaltic motion was performed with difficulty, and the disorder communicating itself to the rest of the intestinal canal, occasioned those colics with which the patients were affected.

It is frequently very hard to reduce the *epiplocephalos* by the *taxis*, tho' there is no strangulation. The reason of this difficulty is, the *epiploon* forms several cells in the hernial sac, each of which contains a fold of the intestine. I have seen these cells marked and distinguished by several adhesions of the *epiploon*, in different parts of the *sacculus*. In this case, the attempts that are made to reduce the intestine prove unsuccessful, from the difficulty there is in distinguishing it from the *epiploon*.

WHEN we perform the operation of the *exomphalos*, we are not certain of finding the intestine covered by the *epiploon*; and if it is, it may adhere to it, and therefore we cannot make the first incision with too much caution.

IN the inguinal *hernia*, the incision is made longitudinally; here it must be crucial, as well in the herniary bag as in the skin: in all other respects, the operation is the same as for the inguinal *hernia*.

IF there is a great quantity of the *epiploon*, there must be several ligatures made upon it to secure the hæmorrhage, which is sometimes very considerable; and afterwards what is superfluous should be cut off.

To conclude, if the *sacculus hernialis* is very large, we must take off part of the angles formed by the crucial incision.

As to the dressings, they scarce differ at all from those of the *enterocoele*.

Of the ventral Hernia.

WHAT is commonly termed a ventral *hernia* is a tumor formed on one and sometimes on both sides

sides of the belly, by the *epiploon* and some of the intestines, which raise up the teguments. It is soft, elevated, and larger at its basis than at its superior part. It disappears when pressed upon, and returns again when the pressure is removed. I have seen an *hernia* of this kind take up the whole anterior part of the belly, extending itself on both sides.

CAUSES. The cause of this sort of *hernia* is from the relaxation of the containing parts, both those that are called common, and those that are proper to the *abdomen*. These membranes being stretched to a certain degree, may, from different causes, lose the greatest part of their elasticity; and this we see chiefly in such women as have had a great many children. Some have those swellings on each side of the belly, which are filled with the intestine and *epiploon*, and disappear when pressed. They arise sometimes too from a dropsy; and may also be occasioned by the excessive bulk of the *epiploon*.

As each of the *musculi recti* is inclosed in a very strong sheath, this kind of ventral *hernia* is seldom formed where these muscles are situated, but generally on the sides of them.

PROGNOSTIC. As these *herniæ* are never attended with a strangulation, they are not reckoned dangerous; nevertheless, if all the containing parts have lost their elasticity, as I once saw in a young woman who was very fat, this relaxation will produce symptoms from the contained parts being deprived of their support. Thus the intestines and the weight of the mesentery strain upon their ligaments at the *vertebræ* of the loins; the liver draws down the diaphragm; and from this extension

sion or straining, which is almost general, ensue pain, swoonings, and oftentimes diseases: as happened in this young woman, who could neither stand nor sit, but was obliged to lie down, because that posture, being horizontal, delivered her from those dragging pains occasioned by the weight of the *viscera* when not supported.

CURE. A pretty tight bandage, or a pair of stays of a proper make, are sufficient to stop the progress of these *herniæ*; and if they are grown considerable, as that just mentioned, we must make the patient wear a bandage like a sling, which supplying the want of strength in the containing parts, may bear up the *viscera*. This sort of sling is supported by a girdle round the waist; but if the belly is very heavy the patient will not be able to bear this girdle, which, however broad it may be, will cut the waist: to remedy this inconvenience, the patient must wear, under the shift, a sort of whalebone boddice, strengthened behind with four busks of the same, one end of which must bear upon the back, and the other upon the top of the buttocks; the girdle will then press upon this without hurting the patient, and will keep up the sling that supports the belly. I have seen *herniæ* of this nature cured by these applications, continued for a longer or shorter time, according to the degree of the disorder: that which I have been speaking of, was cured in less than six months; so that the size of the belly was diminished one half.

THERE may be yet another kind of *ventral hernia* formed in the *abdomen*, which is so much the more dangerous as it appears but little externally, and consequently may happen without being discovered:

vered: this does not come on the sides of the belly, but under one of the *musculi recti*, and within the sheath which incloses it: to render this intelligible, I shall explain it by an example.

A MAN has formerly received a wound by a sword, which went through one of the *musculi recti*, and penetrated into the cavity of the *abdomen*. This wound has been long healed; but that part of the tendinous sheath which lies under the muscle, and the *peritonæum* when they were cicatrizing, adhered to the muscular substance; for the lips of a wound in the *peritonæum*, and other tendinous parts, never unite together. In this case then, the intestine forcing the internal cicatrix, intangles itself between the muscular fibres, after having first separated them from each other. The tendinous sheath strangulates and compresses that part of the intestine which has passed, and that strangulation produces all those symptoms which, in treating of the inguinal *hernia*, we have observed to be inseparable from it.

THESE symptoms often deceive people, being almost of the same nature as those that attend the colic called *miserere*; and for want of due consideration, or information, they endeavour to cure an imaginary disorder, instead of the real one.

SIGNS. A violent pain in one particular point, and symptoms similar to those before-mentioned, as attending the inguinal *hernia*, may discover to us the nature of this disorder, especially supposing the patient has been formerly wounded in that part of the *abdomen*; and the touch will help to confirm our opinion, notwithstanding the thickness of the *musculus rectus*, which covers the *hernia*.

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PROGNOSTIC. The symptoms will never cease while the strangulation remains, and as the thickness of the *rectus* will neither allow emollient topics to penetrate to the strangulation, nor suffer the surgeon to attempt the reduction of the intestine by the *taxis*, another operation must be undertaken, to reduce it without delay.

CURE. The patient being laid upon his back, with the breast and knees a little elevated, in order to relax the skin and muscles, I make an incision through the skin exactly upon the swelling: the skin and fat being divided, I make a slight opening in the *aponeurosis*, which covers the *rectus*, and introducing a director, I enlarge the incision above and below, observing not to cut any of the nervous interfections. This done, I proceed with great circumspection to cut into the body of the muscle; for the intestine lies directly under it, or rather between its fleshy fibres, and is not inclosed in any herniary cyst. Proceeding thus gradually in opening the muscle, I divide it upwards and downwards, observing the same caution about the nervous interfections as was before-mentioned. Having discovered the intestine, we may frequently reduce it without making any further incisions; but if this cannot be done, we are to convey a director within the stricture, and with the same hand covering the intestine, we introduce a strait bistory into the groove of the director, and divide a little of the stricture; for a slight incision in the *aponeurosis* is sufficient to remove the strangulation. This might be more easily performed by my hernial bistory, and without danger. The dilatation being made, the intestine is to be returned into the *abdomen*.

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THIS opening in the teguments is not considerable enough to require the *gastroraphy*; but, nevertheless, the wound must be dressed in such a manner, as to prevent the intestine from pushing out again. This may be done by a pellet of lint, wrapt up in a fine rag, and applied upon that part of the belly where the opening is made; taking care to secure it, and to apply a fresh one at every dressing till the wound is cicatrized.

THE wound being healed, the patient may be subject to a return of the disorder; but to prevent that, he must constantly wear a pellet or bolster fastened on with a girdle upon the cicatrix, to hinder the parts from pushing out upon any strain.

NOTWITHSTANDING the exactness, with which I have endeavoured to particularize the differences to be found in *herniæ*, there may yet be others that may have escaped my notice, and of which daily experience may afford us examples.

Of the D R O P S Y.

THE dropsey is a disease wherein part of the *serum* of the blood, separating, and quitting the course of the circulation, stops in some of the cavities, and there stagnates.

THERE are two species of this disease: one produced by infiltration or transudation, the other by effusion. In the first, which is called an *anasarca* or *leucophlegmatia*, the *serum* is diffused into, and fills the cells of, the *membrana adiposa*, and oftentimes the whole cellular substance of the body, as well in the great cavities as in the interstices.

OF THE DROPSY. 113

stices of the muscles. If the transudation affects only one or more particular members, it is termed an *œdema* or an œdematous swelling. In the second kind of dropsy, the *serum* is collected in some particular cavity, and the disease assumes different names according to the place where it is situated. Thus, when it is lodged in the *abdomen*, it is termed an *ascites*; in the head, an *hydrocephalus*; in the *thorax*, an *hydrops pectoris*; and when in the *scrotum*, an *hydrocele*. An *anasarca* and a dropsy of some particular part may affect a person at the same time.

As the principal design of this treatise is to offer such assistance as surgery affords, I shall not enter into any farther accounts of diseases than will be necessary to inform us, 1st, whether they can be cured by chirurgical operations; 2dly, what kind of operations are proper upon the several occasions; and thirdly, as to the time and manner of performing them. For this reason I shall say but little about the causes of the dropsy; and in treating of the different species of it, shall pass directly to the diagnostic signs.

Of the Anasarca.

SIGNS. The *Anasarca* is easily known, being distinguishable both by the sight and touch. The whole body is bloated and considerably larger than in a natural state, increasing sometimes to such a degree, that the patient is not only unable to make use of his limbs himself, on account of their weight and size, but from the difficulty there is in moving them, he can hardly receive any help from those who attend him. The colour of the skin is paler than is natural; and

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114 OF THE DROPSY.

upon pressing the finger on any part, the impression for some time remains. In the *abbomen* the navel appears sunk in.

AN *edema* in any part has the same appearances as the *anasarca*.

THE PROGNOSTIC. In order to form a just prognostic of this disease, we must consider the nature of it, and the symptoms that attend it: we may in general affirm it to be very dangerous, as it depends upon the vitiated state of the fluids, which it is not always in our power to remedy.

THE CURE. I have sometimes known instances where the extravasated water has returned into the circulation, and been evacuated either by sweats or urine; but these are miracles which rarely happen, and nature has generally occasion for the assistance of art; *viz.* such as diet and surgery afford. Diet, in this case, is most effectual; it is that alone can correct the vitiated juices of the stomach, which are the sources of indigestions; remove the obstructions which may happen in different parts; restore the course of perspiration and urine; in short, change entirely the texture of the blood, which, by abounding too much in *serum*, overflows the parts.

I SHALL pass over the particular methods directed for this purpose, confining myself to such only as are within the province of surgery.

If the extravasated *serum* does not return into the circulation, the relaxation it occasions of the parts where it stagnates, destroys, in some measure, their elasticity, and puts it out of the power of medicine to act. In which case we are obliged to have recourse to a chirurgical operation to discharge part of the waters.

THIS

OF THE DROPSY. 115

THIS operation is performed by making one or more incisions into the teguments, of a greater or less depth, in which we only imitate nature, who frequently produces a number of small vesications upon the inferior parts, as upon the legs, for instance, by which the waters are discharged. It has been a method made use of by others as well as myself to make incisions three or four fingers breadth long, and two deep, either in the inferior and inner part of the thigh on the side of the knee, or in the lower part of the legs upon the ankles; the swelling being there most considerable. By these incisions, more than half the water that was diffused over the whole body, was discharged in the space of four and twenty hours; for all the cells having a communication one with another, those that were opened filled again as soon as they emptied themselves. I have seen above seven gallons of water discharged this way in the time before-mentioned; but I have found by experience, that these large incisions are subject to great inconveniences. The first is, that in two days, the lips of the wound are nearly closed, having hardly any discharge; so that you are obliged to make new incisions. A second and more considerable inconvenience is, that the very great evacuation made in a short time, weakens the patients so much as to endanger their lives. Thirdly, from a defect of heat in the part, it is sometimes liable to a gangrene. Considering these ill consequences, I have laid aside this method; and in order to procure the same advantages without running any hazard, I now make several punctures near a quarter of an inch deep, in the lower and inner part of the legs, with the *scarificator*. Those

116 OF THE DROPSY.

who are not provided with this instrument may answer the same purpose by making ten or a dozen small punctures with the point of a lancet, just sufficient to penetrate the skin. We find these punctures procure as great a discharge of the waters as the large incisions, and the evacuation being made gradually, is not so liable to weaken the patient; besides as they heal in two days, they are not subject to become gangrenous.

It is true, they must be repeated, but as they are neither attended with pain, nor require any dressing, the patient will hardly oppose their being renewed: and in my opinion, these punctures are the nearest imitation of the natural discharge by the little vesications beforementioned.

Of Dropsies by Effusion.

As the several dropsies produced by effusion, are distinguished by signs peculiar to each species, I shall consider them separately.

Of the Hydrocephalus.

THE *hydrocephalus* is an effusion of water in the *cranium*, between that and the brain, and taking rise from the ventricles is attended with an infiltration of *serum* throughout the whole substance of the brain.

SIGNS. The head is much larger than in the natural state, and more or less so according to the degree of the disease. The bones of the *cranium* which form part of the face, being grown soft, and having changed their figure in proportion to the progress of the distemper, occasions an alteration

OF THE DROPSY. 117

tion of the countenance: the eyes appear almost out of the head, at least project very much, because the hind part of the orbit, which is become soft, is thrust forwards. The softness of the bones of the *cranium* may be distinguished under the finger.

PROGNOSTIC. As the assistance of diet and surgery has been found ineffectual in this disease, it has been hitherto looked upon as incurable.

Of the Dropsy of the Breast.

THE breast, as well as other parts, is subject to a dropsy by effusion; that is, a certain quantity of water is lodged within its cavity, sometimes on one side only, sometimes on both.

THIS disorder, like other dropsies, may arise from the ill state of the juices; but it proceeds more frequently from a disease of the lungs.

SIGNS. The signs of water being lodged within the breast, are, first a shortness of breath, more or less according to the quantity of water therein contained; for the water, in this case, hinders the natural dilatation of the lungs in inspiration. Secondly, Inspiration is more easily performed than Expiration. Thirdly, If the effusion is only on one side, the patient finds it painful to lie on the other; and that side where the effusion happens, if there is much water, is visibly larger than the other; since, upon each respiration, the ribs are necessarily deprived of their motion, and are less depressed in expiration. Fourthly, The face is somewhat swelled, as also the arm and leg on that side where the effusion is lodged. All these signs are attended with other symptoms, proceeding from the original disorder which occasioned the effusion.

118 OF THE DROPSY.

PROGNOSTIC. The dropfy of the breast is one of the most unhappy diseases that a person can be afflicted with, as it proceeds either from a morbid state of the blood, or from a disease of the lungs; and yet I have sometimes seen it cured. Nature has resources which we are unacquainted with; and I have known, though but very seldom indeed, that where the lungs have been sound, the blood has recovered its due consistence, and the extravasated fluid returning by secret passages into the circulation, has been afterwards carried off by the common emunctories. We have room to hope therefore, that a proper diet, with the assistance of nature, may restore the fluids to a good state.

THE extravasated water may be discharged by a chirurgical operation; *viz.* by making a puncture with a *trocar*, four fingers breadth from the spine, between the fourth and fifth of the false ribs, counting from below upwards; and in order to perform this properly, the same precautions must be observed as will be mentioned when we treat of the *ascites*. This operation indeed does not cure these patients, but may afford relief to them, as the quantity of water which fills the breast, and is constantly increasing, distresses them very much, and renders their breath every day shorter and shorter. If the breast is freed from this oppression, the lungs will follow the dilatation of the *thorax* in inspiration, and respiration will then be more easy, and not so short.

Of Dropsies of the Abdomen.

THE *abdomen* is subject to two kinds of dropsies, proceeding from effusion, which, being arrived to

OF THE DROPSY. 119

to a certain degree, seem to the sight and touch to be of the same nature, but are in reality very different. In the one, the water is diffused in the cavity of the *abdomen*, so that the *viscera* swim, as it were, in it: in the other kind, the extravasated fluid is contained in a *cystis*.

Of the Ascites.

AN *ascites* is that sort of dropsy where the water is diffused into, and fills the whole cavity of the *abdomen*.

SIGNS. In this disorder the distention of the belly is in proportion to the quantity of water contained therein, which we may easily perceive to fluctuate by laying one hand on one side of the belly, and striking lightly with the finger, upon the other. The navel protuberates, whereas in the *anasarca* it appears sunk in. The patient is generally very thirsty, his urine high-coloured, very little in quantity, with a lateritious sediment; and the skin dry and hard. When the belly is very full, respiration becomes difficult, the diaphragm being deprived of its free action by the resistance of the water in the belly. In this case the legs and thighs frequently grow cedematous.

The *ascites* is almost always caused by a disease of the liver, or by a schirrous tumor situated in some part of the belly; and the difficulty of removing obstructions in the *viscera* occasions this disease to be generally mortal: we can make therefore but a very bad prognostic, though sometimes I have seen it cured.

CURE. There are two curative intentions to be answered in this case. The first is, to dry up the source of the extravasating fluids; the second

to discharge those which are already extravasated. For the first intention we must have recourse to diet and medicine; as these only, in concurrence with nature, can correct the ill state of the juices, and restore the sound and natural state of the *viscera*, whose obstruction is oftentimes the primary cause of the fluids being vitiated. It has sometimes happened, that by this means the second intention has been answered at the same time, that is, the extravasated water returning into the vessels has passed off by urine; but instances of this kind are very uncommon, and we are generally obliged to have recourse to the chirurgical operation, termed *paracentesis*.

BEFORE we perform this operation, we should inquire if the strength of the patient will enable him to undergo it; and then examine the belly, to discover whether it be sufficiently filled with water; for unless by its tension and resistance we find it so, the operation must be deferred.

THE *apparatus* being ready, the patient should be placed in an easy posture, that he may continue in it till the water is discharged. He might be seated on a chair, but in that position he would be subject to faint before the water was all evacuated; or he may be laid sideways on the edge of his bed; and this posture I prefer, as being most convenient both for the patient and the operator.

IN order to make the puncture, we are to chuse the middle space between the navel and the *crista* of the *os illium*, which is exactly between the fleshy part of the oblique and transverse muscles, and the sheath which they form by the junction of their tendons, to enclose the *musculi recti*. The operation may be performed on either side indifferently, but if the fluctuation is more easily felt on one

one side than the other, that ought to be chosen. If we distinguish any schirrous tumor in the *abdomen*, we are to avoid it by making the puncture on the opposite side. I have often performed it at the upper part of the lumbal regions, on account of a schirrous tumor which possessed the whole *hypogastrium*, and would not allow of my attempting it lower.

THE patient being properly situated, the next thing to be done is to place the assistants so as to support him, and to press softly upon different parts of the belly, in order to force the waters to that side where you propose to make the puncture. The ancients used a lancet for this purpose, but the *trocar* being much more convenient, the use of the former is laid aside. Previous to the operation, we should draw out the *perforator* from the *canula*, lest the point should be rusted in it; in which case, after the puncture had been made, we might run the risk of pulling out the *canula* at the same time we withdraw the *perforator*.

IN performing the operation, I hold the handle of the *trocar* in the palm of my right-hand, placing the fore-finger along the *canula*, and push the instrument at once quite into the *abdomen*. I am certain the point is in the cavity, if it meets with no resistance; when, taking hold of the *canula* with the left-hand, I introduce it a little farther into the belly, and with the other hand withdraw the *perforator*.

THE water now flows through the *canula*, and should be suffered to do so till it is almost all discharged, unless the patient be faint; in which case, we must suspend the evacuation, by putting
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122 OF THE DROPSY.

a finger upon the orifice of the *canula* till the fainting is gone off.

THE water will sometimes cease running before it is all discharged, which is occasioned by some of the parts that are floating within the cavity; as an intestine, or the *epiploon*, getting to the mouth of the *canula*, and stopping it up. In this case I introduce a pretty large probe into the *canula*, and remove the part that obstructed the passage. It would be proper to have the probe bent at one end, lest it slip accidentally out of the fingers, and pass into the cavity.

ALL the water being discharged, I draw out the *canula* with one hand, whilst, with two fingers of the other, I hold back the skin, which then presses much closer upon the pipe than when it was introduced.

THE *canula* being drawn out, I put on some dry lint and a plaster upon the wound, and order the patient to be put into bed; where we cover all his belly with a compress dipped in brandy, and secure it on with a napkin passed round his body. This napkin should be tight enough to supply the defect of the abdominal muscles, which have lost their elasticity by the distension they have suffered from the quantity of water. These muscles, in a natural state, supported the weight of the abdominal contents, and especially of the liver, which is attached to the diaphragm; but ceasing to do so now, it is necessary that the napkin, by its tightness, should supply their office, till the muscles have recovered their strength.

WHEN there is an œdematous swelling in the *scrotum* and the lower extremities, the water will insinuate itself into the *abdomen*, and soon fill it again; in which case the puncture must be repeated,

OF THE DROPSY. 123

ed, unless the texture of the blood be restored, and the urine resumes its natural course.

Of encysted Dropsies.

AN encysted dropsy is a collection of extravasated water or *serum* enclosed in a *cystis*, and is found more frequently in the *abdomen* than any other part of the body. I shall not undertake to determine whether this extravasation proceeds from a dilatation, or a rupture of some lymphatic vessel; or whether it happens by the breaking of some membranous fibre: but this is certain, that we almost constantly find these cysts formed in the cellular substance, which, we know, is no other than a *congeries* of several membranous *laminae*: and the disorder also generally happens on some diseased part, already scirrhus or disposed to become so.

THE water, as it extravasates, distends the coats of the cavity in which it lodges, proportionably to its quantity; and thus the cysts are formed. I have seen one of these cysts, which was situated in the *abdomen*, distended to such a degree as to contain five gallons of water. Having had opportunities, by dissecting bodies, to view many of these cases, I have often observed, that the cysts increased in thickness in proportion as they enlarged in their bulk; inso-much that I have seen some near a third of an inch thick, and adherent to all the parts with which they came into contact by their distention. Sometimes there is only one cyst, but there may also be several together, placed by the side of each other. I have frequently found several little cysts enclosed in larger ones, and attached to their internal

124 OF THE DROPSY.

ternal surface by membranous fibres. I once found eight in one large *cystis*, which were almost as big as hens eggs.

SIGNS. This kind of dropsy, like the *ascites*, has signs which are peculiar to, and distinguish it; and these are different according to the progress of the tumor. Soon after the disease begins, something hard and circumscribed may be felt at the place where the swelling is formed. This hardness is sometimes fixed, and sometimes moveable, and may prove to be either a schirrous tumor, or a watery swelling arrived as yet only to a certain size; but some time after we may feel the tumor considerably increased, and distinguish the nature of it. When it is a schirrous swelling, there is no fluctuation; but if it be a watery tumor, *i. e.* a *cystis* which is filling, a fluctuation may be felt, though the tumor be hard, in much the same manner as we discover the *pus* in an abscess; and even the extremities of the cyst, which spread in different directions, may likewise be distinguished. The swelling is not attended with pain whilst it continues of a moderate size; but when the *cystis* becomes considerably full, it begins then to be painful, acquiring, as was before observed, a greater degree of thickness; and therefore yielding with more difficulty to the increased quantity of the collected water. It also disorders the parts upon which it presses, and thereby disturbs the whole œconomy of the body. The urine is not yet changed, nor its quantity lessened, neither is the patient so much troubled with thirst as in the *ascites*.

To conclude, if the *cystis* has been suffered to increase till it extends through the whole *abdomen*, the fluctuation of the water may be discovered in
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OF THE DROPSY. 123

the same manner as was described in the *ascites*, and upon feeling this fluctuation, many people, that have not attended a patient at the beginning of such a disorder, have mistaken it for an *ascites*. If there are several cysts which are in contact one with another, it is almost impossible to distinguish them by the touch, because the fluctuation is communicated from one cyst to another. In proportion as the cyst or cysts grow full, the quantity of urine lessens daily, and becomes of a lateritious colour, as in the *ascites*, by the kidneys suffering a pressure from the tumor. The thirst is not yet violent; but frequently many other very troublesome symptoms occur, proceeding either from the bad state of the fluids which first caused the disease, or from the pressure of the tumor upon all the *viscera*, more particularly upon the intestines, which are generally found, upon opening bodies that have died of this disease, to be either thrust on one side of the *abdomen*, or pushed up into the *epigastrium*; and being thus removed out of their natural situation, and compressed, the freedom of their peristaltic motion is impeded, and many ill consequences thereby produced. If the internal surface of the *cystis* ulcerates, and begins to suppurate, the tumor soon becomes very painful, attended with a fever and *diarrhœa*; and if the puncture be made into it, the water that is discharged is either purulent or bloody. Having often made the puncture upon encysted tumors of this kind, I have found the fluid of a bloody colour; and upon letting it settle, there has been two quarts of blood in about four gallons of the discharged liquor.

PROGNOSTIC. In order to form a right prognostic of this kind of dropsy, it is necessary to

consider its causes and progress. If it proceeds from a schirrous tumor upon which the *cystis* is formed, it is a symptomatic disease, the event of which depends upon that of the *schirrus*; and if the remedies prescribed for the *schirrus* are insufficient to dissolve it, the patient will die rather from the increase of that and other obstructions formed in different parts, than from the dropsy. I have frequently known this happen to women, who, at the time their *menfes* left them, have been afflicted with these schirrous tumors and encysted *dropfies* at the same time. It is true, the dropsy may hasten their end, if the watery swelling is suffered to encrease till it fills the whole *abdomen*: Its pressure upon the parts will obstruct the secretions, and thereby changing the whole of the œconomy of the fluids, will produce the most fatal symptoms. Besides this, the internal coats will ulcerate and come to suppuration, as may be discovered by the signs we have already given upon that head: but if there is only a watery tumor, which, by being timely discharged, is not suffered to increase to any considerable size, the obstructions and the vitiated state of the fluids will then determine the patient's days, and not the dropsy, which in that case will be of little consequence. When the water is let out, proper remedies may then take place, if assisted by nature.

CURE. Upon a supposition there is but one cyst (which is discoverable at the beginning of the disease) there are two ways of emptying it. The first, by making the puncture with a *trocar*; the second by opening the *cystis* by an incision.

THE resemblance between encysted dropfies and the *ascites* has occasioned their being treated in the same manner; nay, though the tumor was
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known to be encysted, the puncture with the *troc*-
car was deferred till the *cystis* was full and ex-
 tended all over the *abdomen*; the consequence of
 which was, that after some repetitions of this ope-
 ration, the patient died from the causes before re-
 lated. The frequent opportunities I have had of
 opening the bodies of persons who have died of
 this disorder, and of observing the different pro-
 gress it has made in different patients whom I have
 attended, has enabled me to distinguish these kind
 of dropsies perfectly; and to discover that punc-
 tures have been very proper in some cases, but by
 no means so in others. I would recommend the
 puncture therefore when there is only a single *cy*-
stis, whilst it is yet small and of a moderate thick-
 ness; and I prefer this method not only because
 it is possible the *cystis*, when quite emptied, may not
 fill again, as sometimes has happened; but also be-
 cause this operation, which is neither painful nor
 requires any dressing, answers the intencion of
 cure, by preventing the growth of the *cystis*, and
 consequently its pressure upon the *viscera*. The
 essential point then, to repeat what I observed be-
 fore, is to prevent the growth of the tumor by this
 operation; upon which account it must be perform-
 ed as soon as ever the fluctuation of the water can
 be plainly perceived. If the *cystis* fills again, as
 most commonly happens, it must be emptied as
 soon as it is arrived to the same bulk as when the
 puncture was first made. If there are two cysts,
 and they are easy to be distinguished, it is almost
 impossible to empty them both by puncture the
 same day; for when the first has been evacuated
 by this operation, the other having then no pres-
 sure against it, subsides, and does not afford a suf-
 ficient resistance to the *troc*car to render the punc-
 ture

ture either easy or safe. If the internal surface of the *cystis*, supposing there is only one, begins to suppurate, which may be known by signs before-mentioned; or if the *cystis* is become large enough to extend through the whole *abdomen*, the puncture in this case would prove but a small relief, for the following reasons. First, if there are several cysts inclosed in the large one, they will not be emptied with it, but continue intire. Secondly, if the internal coats suppurate, we can neither apply the proper remedies, nor can the *pus* be discharged. Thirdly, these great cysts often fill again in less than three weeks, which soon destroys the patient.

THE puncture then, in these cases, is useless; and therefore I should prefer opening the cysts by an incision, which I have found of much greater service. It is true this method does not absolutely cure the patient, but it prolongs his life; the *cystis* is by this means emptied, and as it cannot fill again whilst the wound continues open, its sides draw near each other by their elastic disposition, and are assisted herein by the pressure of the neighbouring parts upon its circumference. Thus all the little orifices, through which the water made its way, are gradually closed: hence likewise the internal parts of the *cystis* suppurate, as they approach near each other, and the pain ceases. In short, by this means the small cysts, which are very thin, and are inclosed in the great one, empty themselves daily; and the membranes which form them, come away in pieces, by the suppuration of the internal coats of the large *cystis*. It may be objected, perhaps, that the incision made into the *cystis* is only changing one disease for another, as this opening produces a wound which

which must be dressed for a month or six weeks, and at last remains fistulous. But these inconveniences, when compared with the advantages resulting from this operation, are of too little moment to induce us to prefer the puncture in these cases.

It is easy to determine the proper place for opening the *cystis*. In cases where the puncture with the *trocar* is preferable, we must chuse the most depending part of the *cystis*, that it may be emptied entirely. The puncture is to be made in the same manner, and with the same precautions, as are directed in the *ascites*.

If we propose to make an incision into the *cystis* in order to prevent its filling again, we must here likewise chuse the most depending part, that what is to be discharged by suppuration may the more readily issue. The method of doing this, is by passing the point of a straight bistory quite into the *cystis*, and making an incision, of the breadth of four or five fingers, both in that and the teguments. Thus the water is immediately discharged, and the lips of the wound contracting, the incision soon afterwards is not above half so large as it was at first. In order to keep it open, we must introduce a flat, soft, linen tent, of such a length and size as to reach into the *cystis*, without distending the lips of the wound. The tent should be covered with a plaster somewhat larger than the wound, and the whole kept on by proper compresses and bandages.

In four and twenty hours there will be a considerable discharge from the wound, which may make it necessary to put on fresh dressings. The chief end of the dressings is to preserve the opening with a tent, without giving the patient pain,

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and in three or four days to throw some deterfive injections into the *cystis*, which will bring away several sloughs upon the dressings. I have seen, after a few days, some water issue out again distinct from the *pus*, which certainly came from one of those small cysts that are sometimes found in a large one, and which had then burst. Having made an incision into one of these large cysts, which had not yet suppurated, (for the colour of the water was unchanged), and throwing some injection into it, the patient was seized with a shivering whenever I did it; but this never happened when I injected into those cysts which had begun to suppurate before the operation was undertaken.

WHILST the *cystis* suppurates, its coats contract gradually like those of the *uterus* after delivery, and the *cystis* seems so recede towards the schirrous tumor upon which it was formed, and which served as its *basis*.

THE wound, which has imperceptibly diminished, still remains fistulous; that is, there will be a small opening, through which some drops of *pus* will daily discharge; and it must necessarily continue fistulous, because the internal sides of this great *cystis* will not unite together, as I am convinced from several instances.

As soon as the large *cystis* is emptied, the urine, which before was lateritious and but little in quantity, as in the *ascites*, returns to its natural course and colour; and all the symptoms, which either the pain or weight of the *cystis* had occasioned, abate or gradually go off.

I SHALL leave it to the physicians to prescribe the proper remedies for dissolving the schirrous tumors, correcting the juices, and restoring the natural

OF THE DROPSY. 131

natural evacuations; the defect of which may probably have produced the vitiated state of the juices.

Of the Hydrocele.

THE *hydrocele* is a collection of extravasated lymph or serum lodged in the *scrotum*. This disease is divided into two kinds, viz. one produced by infiltration or transfudation, the other by effusion. Of the first species is that where the water fills only the cellular texture of the *scrotum* and the *tunicæ vaginales*: the other kind of *hydrocele* is, when the lymph is collected in one single cavity, as in a *cystis*. These two distempers being quite different, I shall consider them separately.

Of the Hydrocele by infiltration.

THE *hydrocele* by infiltration may be either simple, or symptomatic and complicated, as being the consequence of some other disease. The diseases which usually produce it, are the *ascites*, the *anasarca*, or the oedematous swellings of the legs and thighs.

Of the simple Hydrocele by infiltration.

THIS *hydrocele* generally affects the *scrotum* only. We frequently observe it in young children; for this part soaking continually in urine, occasions an irritation there, and a distension; in consequence of which, its cells are filled with a serous fluid: hence the *scrotum* becomes transparent, the skin loses its redness, and, if pressed, retains the mark of the finger; the *raphe* still preserving its situation in the middle of the *scrotum*.

THE method of curing this disorder is either by fomentations made with lime-water and brandy, or the application of rags dipped in these liquors.

Of the symptomatic or complicated Hydrocele by infiltration.

THE infiltration which causes the complicated *hydrocele*, does not affect the *scrotum* only, but extends farther. In this disorder, the whole *scrotum* makes one tumor of a greater or less size, of a pale colour, indolent, and transparent; and retains the impresson of the finger. This œdematous swelling frequently spreads to the *penis*, rendering it very large and contorted; and sometimes the swelling extends to the *perinæum*. The *raphé* appears in the middle of the tumor, and seems to divide it into two equal parts.

THE cause of this *hydrocele* is to be deduced from that of the distempers by which it is occasioned: distempers in which the *serum* of the blood separates, and overflows the parts.

It will be unnecessary to particularize the diagnostic signs of this disorder, since those which are peculiar to, and distinguish it from, other *hydroceles*, have been mentioned in the foregoing definition.

As this *hydrocele* is only a symptomatic disorder, and the almost necessary consequence of the infiltration throughout the *membrana adiposa* of the whole body, or at least of the *abdomen*, legs, and thighs, the cure of it depends upon removing the cause of the original disorder.

BUT though we cannot expect an absolute cure of this sort of *hydrocele* while the original disease subsists;

subsists; yet we are to endeavour, as much as possible, to stop the progress of it. The swelling of the *scrotum*, which increases to a monstrous size in proportion as fresh *serum* infiltrates into it, may degenerate into a gangrene, which we must try to prevent by the application of discutient fomentations; and if these prove insufficient, and the swelling increases so as to threaten a mortification, we must endeavour to prevent it by the assistance of surgery.

SOME propose to make an incision on each side of the *raphé*, full a finger's breadth deep. I have tried this method, and have found indeed that the water ran out very readily; but, before the fluids were quite discharged, and the *scrotum* returned to its natural state, the incisions began to close, the evacuation lessened, and in a few days quite ceased; so that it soon after became necessary to repeat the incisions. Besides, as the blood circulates very slowly in a part thus abounding with water, and where the natural heat is deficient, I have more than once known these incisions attended with a gangrene. These two inconveniences have induced me to prefer the making small punctures in the *scrotum*, either with the *scarificator* or the lancet, which will answer as well. These punctures penetrate but superficially indeed, yet the *serum* discharges through them as readily as by large incisions. It is true, in a day or two they likewise require to be repeated, but still are to be preferred, as they are free from pain, and therefore the patient will submit to them as often as is necessary. In the next place, as they heal very well without dressing, they are not, like the large incisions, subject to gangrene.

Of the Hydrocele by effusion.

THE *hydrocele* by effusion, as was before observed, is a tumor or bladder of water lodged in the *scrotum*, and may be either simple or symptomatic and complicated.

Of the simple Hydrocele by effusion.

THIS kind of *hydrocele* is a tumor in the *scrotum*; in some degree transparent; of a round or rather oval figure; smooth and even in its surface; attended with little or no pain, and more or less hard; in which the fluctuation of a fluid is perceptible, and in which the finger leaves no impression.

THIS watry tumor is situated upon one of the testicles to which it adheres; and as it sometimes grows very large, it almost fills the whole *scrotum*, and presses against the *septum*, so that the *raphe* seems to separate the *scrotum* into two unequal parts. If there are two *hydroceles* by effusion and equal in bulk, *viz.* one upon each testicle, they may both be easily distinguished by the touch; and the *raphe* then divides the *scrotum* into two equal parts. I have seen *hydroceles* which have contained a quart of fluid. The fluid or liquor with which they are filled is a sort of lymph, resembling urine in colour but not in smell, and, being warmed over a slow fire, becomes of the consistence of a jelly. I have often seen these aqueous tumors, of the size of grapes, situated in different parts of the spermatic chord, and attended with a real *hydrocele* on the body of the testicle. I have pre-
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served an anatomical preparation, which shews four little tumors of this kind, round, and of the size of small nuts; and which being formed between the membranes of the *peritonæum*, appeared outwards under the *ligamentum Fallopii*. This happened in a man who had a real *hydrocele* by effusion, on the body of one of his testicles. The resemblance of these watry swellings to what are called *hydroceles*, renders it not improper to let them pass under the same name.

It is very difficult to determine what may be the cause of the simple *hydrocele*. I was at first inclined to think it might be produced by some slight disorder of the testicle, having often seen it appear after a blow, fall, or strain of that part. I imagined that some of the fibres which connect the membranes of the *tunica vaginalis* might by this means have been broken; but reflecting that those little tumors above-mentioned, which accompanied real *hydroceles*, were of the same nature; and, like them, were situated either in the cellular substance of the *tunica vaginalis*, or in that of the *peritonæum* near the *ligamentum Fallopii*; I am persuaded that the *hydrocele* is produced either by a vitiated state of the lymph, or a disorder of the *peritonæum*. I shall look upon it therefore as a sort of encysted dropsy, such as is often found in one of the *venters*. I have already observed, in treating of the dropsy, that these *cysts*, when situated in the *abdomen*, have been distended so as to contain a large quantity of fluid, and have been mistaken for the true *ascites*.

It is unnecessary for me to mention the signs peculiar to this kind of *hydrocele*, as it would be only a repetition of what has been said in the definition.

136 OF THE DROPSY.

THE cure of this disorder is either palliative or radical.

THE palliative cure is performed by emptying the *cysts* by a puncture with a *trocar*.

It is called palliative, because the *cysts* will fill again after it has been emptied; and will require the operation to be repeated, sooner or later, according to the time it takes in filling.

THE radical cure is a more considerable operation, and intended to remove the disorder intirely without being subject to a return. In regard to the performing either of these operations, the choice should be left to the patient. The palliative cure is very expeditious, is performed almost without pain, and does not require any dressing; and this is what I would propose for grown people. The radical cure is not to be effected without an operation that is attended with more pain than the puncture, and for six weeks, or thereabouts, requires to be properly dressed. This, however, is the method which I would recommend for children, who, having so large a space of time in prospect, ought not to be subjected to the repetition of an operation during life.

Of the Puncture. In order to perform this, it is proper the *cysts* should be full, that the *trocar* may penetrate it more easily. The patient being seated, I compress the *tumor*, with the help of an assistant in several places, but particularly in the superior part, to render the tumor more tense: taking care, as the testicle lies underneath, not to hurt that: then, chusing a point where no large blood-vessels appear under the skin, I pierce the tumor, with the *trocar*, quite into the water, observing not to push it so far as to wound the testicle. This done, I draw out the *perforator* with

one hand, whilst, with the other, I push in the *canula* a little farther. I hold the *canula*, during the discharge of the water, till just before it is all run out, when I let it go, lest by continuing to hold it, the extremity should touch the internal surface of the *cystis*, and by its irritation occasion an inflammation upon that and the whole *scrotum*. When all the water is discharged, I fix the skin with two fingers of one hand, and draw out the *canula* with the other. A little dry lint kept on with a plaster is sufficient for the dressing, taking care only to support the *scrotum* with a suspensory.

It may be asked, whether, before the *canula* is removed, the injecting some desiccative medicine through it, which might close up the mouths of those vessels that discharge the lymph into the cyst, and letting it out after it has been confined there a little, would not be sufficient to procure an union of the sides of the cyst; but this method could never succeed, from the impossibility there would be, after the injection had been used, of bringing the sides of the *cystis* exactly into contact, and of keeping them so; besides which it might be liable to produce an inflammation.

Of the radical cure. The operation by which the *hydrocele* is radically cured being of more consequence than the puncture before-mentioned, the patient must be prepared for it by bleeding, and a proper regimen.

THE dressings being ready, and the patient laid upon a bed, I make an incision into the *scrotum* the whole length of the *cystis*, dividing the *cystis* at the same time. The water being discharged, the coats of the *cystis* contract a little. If the disease be recent, the *cystis* is very thin, and as it will

will soon suppurate, it would be unnecessary to meddle with it; but, if the cyst has been long formed, it is grown thick, and very large; in which case part should be taken off. In order to do this, I take hold of the sides of the cyst between my fingers, and cut away as much of it as possible, and with it part of the *scrotum*.

WE are to take care not to cut the spermatic vessels that adhere very closely to it, which we could not avoid doing if we were to extirpate the *cystis* intirely: as part of it therefore must necessarily remain, we moisten the inside of the wound with alum water, which purses it up, and produces a suppuration of the remainder of the *cystis*; so that the flesh, after the eschars are fallen off, appears granulated and firm, and the wound requires no other dressing afterwards than what is common to simple wounds. It is proper however to observe that, as soon as the flesh begins to grow red, we must avoid using unctuous medicines, as such applications are particularly subject to produce a *fungus* in these parts.

Of the symptomatic Hydrocele by effusion.

THE symptomatic *hydrocele* by effusion proceeds from some other disease, which occasions a watry tumor or bladder in the *scrotum*, like that which we have just been speaking of: like that too, it is of a larger or smaller size, according to the quantity of water collected in it, and is accompanied with a fluctuation. There is however some difference between these tumors, as we shall soon see.

THERE are two diseases which may produce this kind of *hydrocele*. The first is that species of dropsy termed *ascites*, when the patient has at the same

same time an hernial cyst, which extends into the *scrotum*, and is the consequence of a complete *bernia*. This kind of *hydrocele* does but rarely happen, at least I have never seen it above twice. The second, which is more common, is a disease of the testicle.

The Hydrocele formed by a cystis bernialis.

SUPPOSE a person has an *bernia inguinalis*, and he becomes dropical; a truss, by pressing upon the ring, may support the intestine or *epiploon*, so as to keep them from falling down into the *cystis*; but, notwithstanding this, part of the water that is extravasated into the *abdomen*, will pass down into the *cystis* and fill it. Nay, it is possible, though the *bernia*, by the use of a truss, has been long cured, that the *sacculus bernialis*, which always remains, and whose entrance or mouth never closes exactly, nor its internal sides unite, unless from an inflammation of those parts; it is possible, I say, that the *cystis* may be filled by some of the water which is diffused in the *abdomen*. In either of these cases, the swelling of the *scrotum* is smooth, and free from pain; but of a longer shape than other *hydroceles*. I made the puncture once with the *trocar* in this kind of *hydrocele*, and the extravasated water was discharged; but the internal opening made by the *trocar* in the *bernia* sac probably not closing so soon as that in the external skin, a prodigious quantity of water insinuated itself into the whole cellular substance of the *scrotum*, insomuch that it became twice as large as one's head: undoubtedly this water came from the *abdomen*. In less than a fortnight, this last *hydrocele*, which proceeded from infiltration, was dis-

dissipated ; the opening that had been made in the *sacculus* being in that time very likely closed ; but the *hydrocele* of the *bernial cyst* soon appeared again ; from whence we may infer, that this disease cannot be cured, but by curing the *ascites* which occasioned it. In my *Observations*, page 260, there is an account of another *hydrocele* contained in an *bernial sac*, the entrance of which was closed ; but this sort of *hydrocele* is very uncommon.

Of an Hydrocele from a diseased Testicle.

THERE are many disorders that affect the testicles, and these disorders have different degrees ; but they are not all complicated with *hydroceles*.

THAT kind of *hydrocele* which is formed on a diseased testicle, hath, as well as others, its degrees of increase ; but is attended with this particular circumstance, that it depends entirely upon the event of the disease in the testicle ; and therefore it is very rare that it continues for any time without some supervening accident, whereas the simple *hydrocele* may remain, without any considerable inconvenience, to extreme old age.

WHEN the *hydrocele* is simple, and considerably large, it is very difficult to distinguish the testicle ; but in that which is complicated, and where the size of the testicle is increased, it may easily be perceived ; and the more so, as it is generally very hard. In short, that which is simple is always free from pain ; whereas this becomes painful if the testicle imposthumates or turns cancerous, as frequently happens.

WHILST the disorder of the testicle does not increase, we can only propose a palliative cure, proceed-

proceeding no farther than the puncture; but if it augments to a certain degree, we must by all means perform the operation of castration, unless the patient be unable to undergo it.

If this operation be necessary and practicable, the *hydrocele* that accompanies the disease of the testicle, occasions no other difference in performing the operation than that of making the ligature of the spermatic chord above the *cystis*, in order to extirpate the whole together.

THE *hydrocele* by effusion, of what kind soever, may be partly covered by a *sacculus bernialis* of a greater or less size, and filled with a portion of the *epiploon*; which case I have seen. The *bernia*, which was very large, covered almost all the *hydrocele*, though there was near a pint and a half of fluid contained in it; the whole together making a swelling, of which it was so much more difficult to form a judgment, as it was very painful from the violent extension of the *cystis*; which reached through the ring quite into the *abdomen*, notwithstanding the hernial cyst.

IN such cases where the puncture is to be made, the operator cannot be too careful to avoid pricking either the *cystis bernialis*, or the testicle. If castration is to be performed, he must in the like manner have a regard to the hernial sac, supposing he cannot reduce the *bernia*.

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DISEASES of the TESTICLES.

EACH of the testicles is described by anatomists as a conglomerate gland, situated in the *scrotum*, and serving to separate the *semen* from the blood for the propagation of the species. The vessels belonging to them pass through the cellular substance of the *peritonæum*, which, in the ring of the *obliquus externus*, collects them together in the form of a chord. This cellular membrane, extending still farther, incloses the testicle, and forms the *tunica vaginalis*. The whole is covered by the *musculus cremaster*, which, taking its origin near the ring, assists the *peritonæum* in suspending the testicle in the *scrotum*.

THE testicles and their teguments may be affected with the same diseases as the other soft parts; and besides these, they have likewise disorders peculiar to themselves. They may all proceed from external causes, as blows, compression, puncture, or incision; or they may arise from a general vitiated state of the juices; and sometimes from a simple obstruction only, the fluids being then no otherways in fault than merely from a defect in their circulation: at other times they are produced from a change in the state of these suppressed fluids; and oftentimes from a critical or symptomatical defluxion upon these parts, proceeding from a venereal or cancerous *virus*. A disorder of the testicle therefore may be simple; it may become otherwise by the corruption of the fluids which stagnate there; and, if arising from

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OF THE TESTICLES. 143

an internal *virus*, it may be complicated with other symptoms, proceeding from the same taint.

Most authors have comprehended all these diseases under the general name of *sarcocoele*, as if, in consequence of such diseases, the testicle became a fleshy substance, and troublesome no otherways than by its increased bulk: but daily experience shews us, that these disorders are very different one from another; and we see even each particular species of them is liable to many changes and alterations; those which appear most simple, and are produced by external causes, sometimes degenerating into a *carcinoma* and a *cancer*.

THESE disorders, in their first appearance, cannot without difficulty be distinguished as to their nature, unless the true cause be discovered by preceding circumstances, or by their being attended with some other illness arising from the same source. In general, therefore, it is from their progress, only, that we are able to discover their true characters. This progress may be more or less quick, and in its consequences more or less considerable: thus the tumor may remain a long time merely *schirrous*, without increasing much; or it may increase in a little time, and still retain the nature of a *schirrus*. It may change likewise very soon to a *carcinomatous* state, and may not degenerate into a *cancer* but imperceptibly and after a long continuance. The swelling, as it increases, may also extend to the spermatic chord; and this is what is most to be apprehended; especially if it is disposed to be *carcinomatous*, or is become so by the corruption of the fluids therein confined.

I HAVE known the spermatic chord grown very much enlarged, and sometimes very hard, not
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only below the ring of the *obliquus externus*, but also extending considerably higher into the *abdomen*. In other cases I have observed that the chord seemed found from the testicle to the ring; but by tracing and carefully feeling it through the skin and the abdominal muscles, I have found out some small tumors here and there, shaped like olives, proceeding from the same cause and being of the same nature with the disorder of the testicle. I have seen likewise another instance of these tumors, which grew within the cavity, and swelling even to the size of one's head, killed the patient in less than six months.

PROGNOSTIC. The prognostic of this disorder, which is to be gathered from the nature of the tumor, ought to be given with great caution at the beginning of the distemper, as it is then very difficult to be distinguished: but this uncertainty does not continue long, for the disorder, either by easily yielding to internal medicines with the application of proper topics, or by its resistance to these means, soon discovers to us whether the swelling is simple, or whether it proceeds from a venereal or cancerous *virus*; as also whether it can be cured without an operation, or can be removed only by extirpation.

THE worst consequences are to be apprehended, if the spermatic chord is diseased within the cavity of the *abdomen*, as the operation is then scarce practicable, from the difficulty and even danger of making the ligature upon the chord higher up than the ring of the *musculus obliquus*. See my *Observations*, p. 259. Nevertheless this method has sometimes succeeded, and probably it was when the chord was but little swelled, and the disease proceeded not from any internal cause.

CURE.

OF THE TESTICLES. 145

CURE. It may be urged, that when the testicle is so diseased as to be incapable of secreting the *semen*, it ought to be extirpated as an useless member; but a perfect cure is not always the object of our endeavours, it being equally proper, at least upon some occasions, to palliate such disorders as will not admit a perfect cure with safety: I would propose therefore, that we should not proceed to castration, till we find the disease is not curable by the help of a proper diet and medicines, but on the contrary increases daily, and is likely in time to become incurable, even by this operation. It is not in all cases that the operation is practicable, which may be owing to a disorder of the spermatic chord, as well as to a diseased state of the testicle. If the spermatic chord is not affected (which we shall be able to judge of by carefully examining and comparing it with that of the other testicle), we may and ought to proceed to castration; but if the spermatic chord is very much swelled, or hard, I should not venture to advise it. I know indeed it is the only absolute remedy, and has sometimes been performed with success; but I consider also, it is too much exposing the credit of the profession, and that the most just and best-grounded prognostic will not always secure us from reproach, when the disease is not removed, or returns again after the operation. It is agreed, that by dilating the ring of the *musculus obliquus*, and extending the incision along the body of the muscle, we may follow the chord between the *laminae* of the *peritonæum*, and divide it a good deal above the ring; but the inflammation which must almost necessarily arise in the *peritonæum* and all the *abdomen*, in consequence of such an incision, is an objection

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that prevents my approving this method. See in my *Observations*, p. 259, an account of such an operation, which proved unsuccessful from an inflammation seizing on the whole belly. It will be prudent therefore in the surgeon to consider every circumstance, in order to form a right judgment whether the operation is likely to be attended with success, or not.

SUPPOSING every thing appears favourable, the patient must be prepared by a proper regimen, evacuations by bleeding, and purging, and such other remedies as are suitable to the case. The patient being laid upon his back, with his hands and legs held fast by assistants, I take up the skin of the *scrotum* with two fingers just upon the tumor, while an assistant does the same, and I divide it with a bistory; then I lay bare the chord, either by dissecting or tearing the cellular substance which covers it, dividing also the *cremaster* muscle longitudinally; by which means I clear the chord in such a manner that all the vessels of which it consists are laid plainly in view. This chord is composed of a nerve, a small artery, several veins, and the *vas deferens*. Of these none except the artery ever give any trouble, and that by bleeding after the chord is divided. I take it therefore between two fingers, where it goes over the *os pubis*, and with it the veins that surround it, and pass a needle armed with two pieces of waxed thread between these vessels and the *vas deferens*; the last of which may be distinguished by its hardness. This done, I draw away the needle, leaving the thread in order to make the ligature if necessary. Immediately I take hold of the vessels below the *os pubis*, and squeeze them between my fingers so as to make a sort of contusion,

OF THE TESTICLES. 147

tion, and then cut off the chord, a little below the bruised part. I next divide the *scrotum*, till I come under the diseased testicle, and with my fingers separate the testicle from the cellular membrane, which connects it to the *scrotum*. If any difficulty is found in separating the membranous parts, I divide them with my scissars; and if I find, after the testicle is extirpated, that the *scrotum* has been too much distended by the largeness of the tumor, I cut part of it off.

It may be asked, perhaps, why I don't make the ligature of the chord immediately below the ring, as authors direct? And likewise, why I do not include the whole chord in the ligature? To which I answer, first, that if the ligature slips, we cannot possibly tie the artery again, because it retires above the ring, where it may discharge blood into the cellular substance of the *peritonæum*, and thereby destroy the patient, as has been known to happen. Secondly, that of the several parts of the chord, none but the artery will bleed; why then should the *cremaster* muscle, the *vas deferens*, and the nerve, be tied with it? We are sensible that convulsive motions have ensued from this method of making the ligature upon them all. Was it the ligature of the nerve that produced these motions, or did they arise from its being made upon the *vas deferens*, the texture of which we know is almost tendinous? If bruising the extremity of the artery is not sufficient to stop the hæmorrhage, a small pledget of lint dipt in styptic water, and pressed dry, will answer the purpose when applied to the end of the divided chord; and especially as the chord is cut below the *os pubis*, that bone will serve to support a compression. But supposing, after all, the

artery should bleed, the thread is ready passed, and the ligature may be made.

IF the spermatic chord is swelled almost as high as the ring, we cannot use this method, but the ligature must absolutely be made immediately below the ring. If the swelling extends higher than the ring, and we cannot avoid proceeding to the operation, there is no ligature at all to be made in this case? but, dilating part of the ring we are to divide the chord, and the artery will not bleed.

SOMETIMES the artery of the *septum scroti* will bleed. When this happens, we must endeavour to discover the place where it is opened, and make a ligature upon it: or else apply a little lint dipt in some styptic water upon the orifice, directing an assistant to hold his hand upon the dressing for a quarter of an hour or thereabouts. The rest of the wound is to be dressed with dry lint, and the whole kept on by a bandage, applied so as not to press upon the other testicle.

THE first dressings should remain on some days; for as these parts are destitute of fat, the dressings are some time before they are moistened by the discharge; and upon this account it would be proper to soften them a day or two after the operation with oil of St. John's wort, or melted lard. Upon removing them, a finger should be applied to the doffil that stoppt the hæmorrhage, that it may remain on till loosened by the suppuration. The rest of the dressings require nothing of a different nature from other wounds; yet one caution may be necessary to the young practitioner, which is, that he should leave off unctuous applications as soon as possible; otherwise a loose flabby flesh will arise

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OF THE PHIMOSIS. 149

in the wound, which will be very difficult either to be destroyed, or consolidated.

Of the Phimosis.

THE *prepuce* is formed by a continuation of the skin of the *penis*, which serves to cover the *glans* when the *penis* is not erected, and to allow for the extension of the *penis* when erected; at which time this portion of the skin that formed the *prepuce* does not cover the *glans*, but falls back upon the *penis*, and serves to cover part of that.

THE *phimosis* is a constriction or straitness of the extremity of the *prepuce*, which preventing the *glans* from being uncovered, is often the occasion of many troublesome complaints. It may arise from different causes, both in children and grown persons.

The Phimosis of children.

CHILDREN have naturally the *prepuce* very long, and as it exceeds the extremity of the *glans*, and is not liable to be distended, it is apt to contract its orifice. This often occasions a lodgment of a small quantity of urine between that and the *glans*, which, if it grows corrosive, may irritate the parts so as to produce an inflammation. In this case the extremity of the *prepuce* becomes more contracted, and consequently the urine more confined. Hence the whole inside of the *prepuce* excoriates and suppurates; the end of it grows thick, and swells; and in some months becomes callous. At other times it does not grow thick, but becomes so strait and contracted as hardly to allow the introduction of a probe.

150 OF THE PHIMOSIS.

THE only way to remove this disorder, is by the following operation. I hold the extremity of the *prepuce* with two fingers; and introducing a director at the orifice, I pass it on till the end of it touches the *corona glandis*. I then slide a straight bistory along the groove of the director, the point of which having reached the *corona*, I cut through the *prepuce* from within outwards, and carry on the incision in the same manner through the whole *prepuce*, by drawing the edge of the bistory towards me: this incision should be made on the side of the *penis*. The internal membrane of the *prepuce* should be cut quite into the *corona*, where it terminates; and if it is not intirely divided by the first incision, we finish the operation with the scissars.

If the end of the *prepuce* is grown thick or callous, it is better to cut it quite off, since the suppuration here, being generally inconsiderable, will not be sufficient to soften it. This operation is the very same with circumcision. The wound will bleed a little, but the blood may easily be stopped by the application of a pledget of lint, held on a few minutes by the hand: for the *penis* is so short, especially in young children, that no bandage can be applied that will keep on. The blood being by this means stopt, we lay on some more lint and a plaister.

EVERY time the child makes water, the nurse must take care to renew the dressings, and in seven or eight days this small wound will be healed.

Of the Phimosis in grown persons.

A PHIMOSIS may affect grown persons from the same cause as little children, and may be cured
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by the same operation ; nor will there be any other difference except in the dressings, which may be more regular by allowing the application of a bandage.

THOUGH there are some grown persons who cannot uncover their *glans*, or at least not without pain, and yet have not the extremity of the *prepuce* so contracted as to confine the urine from passing, we notwithstanding find them sometimes troubled with a *phimosis* ; which might be suspected to arise from a venereal taint, but has in reality a much more innocent cause. There are, we know, sebaceous glands situated in the *prepuce* round the *corona*, which secrete an unctuous humour that passes through their excretory ducts. This humour sometimes becoming acrimonious, irritates the skin that covers the *glans*, and the irritation extending to the internal membrane of the *prepuce*, they both become inflamed, and yield a purulent *serum* ; which cannot be discharged, because the *glans* is swelled, and the orifice of the *prepuce* contracted. I have often seen these disorders cured in two or three days, by frequently injecting wine, or some other desiccative liquor, under the *prepuce*, which washes and brings away the matter that was lodged there, and heals the excoriations of the *prepuce* and *glans*. If these injections should prove ineffectual, we must then proceed to the operation.

WE find also some grown persons, who, though they have never uncovered the *glans*, have been subject to a *phimosis*, from a venereal cause. In some it is owing to a *gonorrhœa*, where the matter lodging between the *prepuce* and the *glans*, occasions the same excoriations as the discharge before-mentioned from the sebaceous glands. This

152 OF THE PARAPHIMOSIS.

accident may likewise be removed by injections. In others it proceeds from venereal chancres on the *prepuce*, the *glans*, or the *frænum*; which producing an inflammation either on the *prepuce*, or *glans*, or both, the extremity of the foreskin contracts, and prevents the discharge of the matter. The parts, in a very little time, are greatly tumified, and I have sometimes known a gangrene come on in less than two days.

In such cases, injections will not be sufficient: we may indeed wash the inside of the *prepuce*, but cannot dress the chancres, and therefore must proceed to the operation before described. The incision is to be made at the most convenient part for dressing the chancres afterwards; observing only to avoid, if possible, making it just on the *dorsum penis*, because the blood-vessels are there largest. If there is a chancre on the *frænum*, that too must be divided.

THE dressings in this case have nothing particular: they must be secured by a proper bandage, and the *penis* kept raised towards the belly, to facilitate the return of the fluids.

I shall say nothing of the method of treating the chancres, as that would require a particular dissertation.

Of the Paraphimosis.

THE *paraphimosis* is a disorder wherein the *prepuce*, being retracted towards the root of the *penis*, cannot be returned again over the *glans*, but makes a sort of ligature behind the *corona*.

THIS disease is easily known: the *glans* is uncovered; the skin tumified on the *corona*, and above it forms a circular collar or stricture, which,
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OF THE PARAPHIMOSIS. 153

from the skin being unequally extended, becomes indented, and make several rings round the part. This disease may proceed from two causes; as first, from the imprudence of young people, and sometimes also of grown persons, who having the end of their *prepuce* too strait, cannot uncover their *glans* without pain, and when they have done it, neglect returning it so soon as they ought; and thus the contracted part of the *prepuce* forms a constriction behind the *glans*. Soon after, the *glans* and *penis* swell, and the *prepuce* being consequently very much distended, is affected in the same manner; an inflammation seizes upon both, and crystallines quickly appear upon the stricture formed by the *prepuce*, so that the whole may be liable to a gangrene, if not speedily relieved. Such is the progress of this distemper.

As all these symptoms will certainly ensue from the stricture formed above the *glans* by the contracted *prepuce*, we must endeavour as soon as possible to return the *prepuce* back again, by drawing the skin over the *glans* on each side. The manner of doing this cannot well be described, but the principal circumstance to be observed, is to bring back the internal membrane of the *prepuce*. If that cannot be done, and the inflation or swelling of the *prepuce* be slight, we must endeavour to relax it with emollient cataplasms, often repeated; but if, notwithstanding this, we find the symptoms increase, we must proceed to the operation in the manner following.

THE *penis* being held, I take a crooked and sharp-pointed bistory, and turning the back of it towards the *penis*, I introduce the point under all the rings one after another, and divide them from within outwards. If we were to begin the incision
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154 OF THE PARAPHIMOSIS.

on the outside, we should do it but imperfectly, if at all. I afterwards make three or four scarifications in the collar or stricture, dividing it transversely, that is, lengthways of the *penis*: by the incision through the rings, I divide those kind of ligatures, which they formed, and by which the swelling was produced; and by the scarifications, I open a passage for the gangrenous *serum* that was insinuated into the stricture by the strangulation.

THE wounds will bleed a little, but the hæmorrhage is soon stopt, by wrapping some dry lint round the *penis*, with a fine rag over that, kept on by bandage. The blood coagulating in the wound will be sufficient to stop the hæmorrhage, and in an hour's time they may be dressed with a digestive, in order to bring on a suppuration. As the first dressings grow dry, and stick to the parts, it would be proper to moisten them with a little brandy before they are taken off, or they would be liable to give pain to the patient in removing them.

IT seems reasonable, that as the disease was occasioned by the *glans* being uncovered, we ought immediately to cover it again, after the operation is finished: but this cannot be done till the cure is completed. The whole intent of making the incisions was to enlarge the *prepuce*, and prevent its causing a fresh strangulation.

THE second thing that may produce a *paraphimosis*, is a venereal *virus*. In adults, whose *glans* is uncovered, there frequently arise venereal chancres in the *prepuce* after impure coition, which, before they digest, are generally attended with an inflammation, more or less considerable. This inflammation is alone sufficient to render the *prepuce* too strait for the size of the *penis*; in consequence of which a swelling or inflation may ensue, like that

that before-mentioned; and this is what is termed a *paraphimosis*. If the swelling is so considerable as to threaten a gangrene, we must proceed to the same operation as was before described, taking care not to make the incision at the place where the chancres are situated, supposing the swelling will allow us to discover that. In this case the incisions do not heal so soon as the former, and the swelling abates but slowly; for the inflammation, occasioned by the chancres, will continue till they suppurate. The operation then, in this case, serves only to set the skin at liberty, which the inflammation had rendered too straight for the size of the *penis*, and to open a passage for the serous matter that the swelling had occasioned to stagnate there. The swelling will not abate much till the chancres are brought to suppuration, nor will it be intirely reduced till the venereal *virus* is thoroughly corrected by remedies proper for that disease.

Of the Amputation of the Penis.

THE *penis* being subject to the same diseases as the other soft parts, it may like them, be liable to an inflammation, and a gangrene, arising from schirrous tumors, a cancer, &c. I have seen the *glans* very large, hard, and carcinomatous, and sometimes almost intirely eroded by a cancerous ulcer. When this is the case, the only means of cure is by the amputation of the *penis*; the manner of performing which I shall here describe, though it has not been taken notice of in any treatise of operations that has hitherto been published.

156 OF THE AMPUTATION

THIS amputation is performed in a very different manner from those of other members, and requires therefore very different precautions. It ought, however, like the other amputations, to be made in a sound part, or it will not answer its design.

THE patient having been properly prepared, I order the *pubis*, *scrotum*, and *perinæum* to be shaved, and then direct him to make water, that he may have no occasion to do it again till some hours after the operation.

THE patient being placed in a chair of a convenient height for the operator, an assistant takes hold of the *penis* at its root near the *pubis*; and as the skin of the *penis* is very loose, and longer than the *corpora cavernosa*, I draw it down towards the *glans*, in order to take off a larger share of that than of the cavernous bodies; for immediately after the operation is over, what remains of these recedes towards their origin under the *os pubis*. I likewise draw down the *penis* a little by taking hold of the *glans*, and with one stroke of the bistory cut through it at the proper place, *viz.* in the sound part. This done, I introduce into the *urethra* a silver or leaden pipe, of the bigness of a middle-sized *catheter*, and of a length proportionable to the remaining part of the *penis*. The pipe should have two small ears, to prevent its slipping into the *urethra*, and these ears are to be perforated to admit a small ribbon through them; which ribbon is to be spread with plaister, and fixed along the remainder of the *penis* to keep the pipe in its place. We must then endeavour to stop the hæmorrhage, which is sometimes very considerable.

THE blood seldom springs out unless some considerable large artery be divided; in which case we must

must make a ligature upon it with a needle and thread. The blood commonly discharges from the *corpora cavernosa*, as if squeezed from a sponge, and therefore cannot be stopt by any other means than by styptics and compression. For this purpose we apply a pledget to the wound dipt in some styptic water, covering it with a round compress of the same breadth, but very thick; and order the whole to be held on by an assistant, pressing upon it for half an hour or an hour. The styptic contracts the cells of the *corpora cavernosa*, whence the blood issues, and coagulates it there so as to stop the passage of the fresh blood, which might otherwise pass out.

WHEN the hæmorrhage is stopt, which may be known by the dressings being dry, we secure the lint by a plaister cut in a crucial form; having a hole in it opposite to the end of the pipe for the passage of the urine, and fixed along the *penis*; as high as the *abdomen*, and down upon the *scrotum*. If enough of the *penis* is left to allow the dressings to be fastened on by a circular bandage, that ought to be applied; and the patient should be kept very still, otherwise they would be apt to come off. The like care should be taken whenever he makes water.

THE pledget is not to be removed till it falls off by the suppuration; after which there is nothing particular required more than in other wounds.

WHEN the wound digests, we may omit putting the pipe into the entrance of the *urethra*, since there will not then be any room to apprehend the closing up the passage in a few hours, as might have

158 OF THE FISTULA IN ANO.

have happened by neglecting to introduce t immediately after the operation. But when the cicatrix is about to form at the *urethra*, the pipe must be again made use of to prevent the entrance of it being too much contracted. For want of a pipe being immediately introduced after the operation, I have known the *urethra* so closed up, that in five or six hours the patient could not make water. Whether enough of the skin had not been taken off, or whether the *corpora cavernosa* had retired too far up towards their origin, the skin was inflated over the wound, and closed it so all round, that it could scarcely be seen. It was with no small difficulty that the entrance of the *urethra* was at last found out; nor could it have been distinguished, but by pressing the finger several times upon the wound, to feel where the urine endeavoured to force a passage. The surgeon then applied the point of his lancet there, and the urine was discharged in a full stream; but having no pipe in readiness, he passed a *catheter* into the bladder till one could be made.

Of the FISTULA IN ANO.

THE *fistula in ano* is a callous ulcer, more or less deep, situated on the side of the *anus*, and affecting the *intestinum rectum*.

THIS ulcer always proceeds from an abscess, which is sometimes formed in an hæmorrhoid, from some previous inflammation there; at others, and indeed

OF THE FISTULA IN ANO. 159

indeed more frequently, in the fat which invests the *intestinum rectum* near the *anus*; and if proper care be not taken, the *pus* will either penetrate the *rectum*, and diffuse itself there, or will push thro' the skin by the side of the *anus*. These abscesses, if opened imperfectly, will never heal; for the bottom of the ulcer being larger than the opening that should give passage to the *pus*, fresh matter will by this means be collected there, whence sinuses and callosities might be occasioned, which would afterwards appear.

DIFFERENCES. The various parts in which these abscesses are seated, the different methods by which they may be opened, the manner in which the *pus* discharges itself, supposing it makes a passage for itself, are the circumstances which create a difference between one *fistula* and another.

WHEN part of the *pus* passes through an opening into the *rectum*, and the rest through one or more orifices in the skin on the side of the *anus*, we term it a complete *fistula*: if the matter passes through a single opening only, we call it an imperfect or blind *fistula*: blind and internal, if the opening be into the *intestinum rectum*: blind and external, if through the skin by the side of the *anus*.

THE number of sinuses to which the *fistula* may lead, forms likewise other differences between them; some having many sinuses, others but one, and some none at all. The cause of these sinuses is, that the opening of the *fistula* will sometimes close several days before the bottom is healed; by which the matter, being pent up, works itself one or more cavities or sinuosities in the fat, till the opening that was closed breaks out again, to make way for its discharge. The sides of these
sinuses

sinuses grow hard in time, and become callous, when they change their former name for that of *fistulous sinuses*. This is what generally happens in old *fistulae*; and hence authors have derived yet other differences from their age.

CAUSES. I have before observed, that all *fistulae in ano* owe their beginning to an abscess. The particular cause of this abscess may be accounted for, from the structure, situation, and uses of the part.

THE *intestinum rectum* is surrounded with fat, provided there by nature, to allow for its giving way to the bulk of the excrements to pass through it; and the more of this adipous substance there is, the more subject will the part be to inflammations, and abscesses, which may afterwards degenerate into *fistulae*.

THE fluids that return from this fat and from the substance of the intestine, in order to be re-conveyed to the heart, must ascend in opposition to their own weight: and they do this with the more difficulty, as the hard excrements which often fill the gut have almost the same effect upon it by a compressure, as a ligature would have, if made on its superior part. This difficulty in the circulation may cause an obstruction, an inflammation, an abscess, and, in consequence thereof, a *fistula*.

THIS difficulty in the circulation is what produces the piles, which are only veins become varicous. Now if a large pile is irritated, either by the passage of hard excrements through the *rectum*, or by any other cause, it inflames and may imposthume; and no wonder if it should afterwards degenerate into a *fistula*.

OF THE FISTULA IN ANO. 161

To conclude, the *rectum*, we know, is the passage for the gross excrements, which descend from the *colon* to be discharged at the *anus*. Now these excrements, in passing out, not only drive back the fluids, but sometimes bring along with them some hard substances, as the bones of fish, or other small bones, which prick the *rectum* and inflame it, or even penetrate as they pass quite into the fat that covers it. Thus we see there are many causes capable of producing such an abscess as may degenerate into a *fistula*.

SIGNS. We may discover a *fistula* by the sight and touch, and even distinguish one species of it from another.

If we see a small orifice on the side of the *anus* surrounded with callosities, and a considerable discharge of *pus* issuing from it, we conclude it to be a *fistula*, which probably affects the *rectum*; and if a thin excrementitious matter discharges at the orifice, or the patient informs us that he has sometimes observed such a discharge, there is no room to doubt of the gut's being perforated; and it is then termed a complete *fistula*. But to be thoroughly informed, we introduce a blunt-pointed probe pretty high up into the *fistula*, and passing a finger up the *rectum*, we feel the probe with the finger.

If the fistulous orifice is external, and the matter that comes from it is free from any excrementitious smell, or appearance, we judge it to be a blind, external *fistula*; but by introducing a probe into it, we may come to a certainty. If the probe passes no farther than the fat, it is probable the gut may not be affected; but if it stops at the gut, which is easily known by the finger being thrust up the *anus*, whereby you plainly distinguish

the probe through the substance of the intestine, we may conclude the *rectum* to be bare, the *pus* having destroyed the fat that covered it on that side. In examining the *fistula*, if the surgeon makes use of a straight fine probe, he may happen to be deceived by the obliquity of the sinuses; it would be proper therefore to take one that is a little curved, whose end is very blunt and large; and introduce it, by gently passing it in without giving it any particular direction; for, as it is blunt, it cannot make any new passages, but will follow those which are already formed.

If the excrements are discharged with *pus* upon their surface, or the same has been observed to come away, either before or after the exclusion of the *feces*, we have reason to suppose it a blind, internal *fistula*; and if, by pressing the finger on the fat near the side of the *anus*, we feel a hardness there, attended with pain, or the patient informs us he has been sometimes sensible of a pain in that part, we may depend upon this to be the case.

PROGNOSTIC. Having fully discovered the nature of the *fistula*, it is no difficult matter to make a right prognostic. Whilst it is simple, and extends no higher than the surgeon can introduce his finger, it may be cured by an operation; but I would never advise making an incision beyond the reach of the finger, because of the hæmorrhage, which might prove very difficult to be stopt. If the *fistula* is attended with an opening in the neck of the bladder, or with a *caries* in the *os sacrum*, or the *coccyx*, as I have sometimes known, the disease is then very hard to be removed, and is frequently incurable.

I HAVE already observed, that every *fistula in ano* proceeds from an abscess, the matter of which

OF THE FISTULA IN ANO. 163

which procures itself a passage either into the intestine itself, which it perforates; or on the sides of the *anus* by an opening through the skin. These abscesses are of three sorts; large, of a middle size or small.

Large gangrenous Abscesses.

UNDER this denomination are ranged those large abscesses, which being formed in two or three days, threaten the *rectum* and the neighbouring parts with a gangrene.

A VIOLENT pain, with a considerable tension, an acute fever, and all the other symptoms which attend the suppuration of large abscesses in general, are common to these; to which may be added, a difficulty of making water, or even a suppression of it; which are usual symptoms in these cases, because the neck of the bladder and the *urethra* are in the number of the parts inflamed and distended by the gangrenous humour. It is to little purpose to endeavour at stopping the progress of this disease at the beginning, by the help of diet, repeated bleedings, or the application of emollient and resolvent topics: it is very seldom these will succeed; and all that can be hoped from these applications, is to prevent in some measure the largeness of the abscess.

IT is in general customary not to open abscesses till the *pus* is formed, but in this case that rule is not to be observed. These abscesses should be opened before the suppuration is quite completed, without waiting till the matter comes forward near the skin; since this cannot be done without its spreading proportionably over the neighbouring parts. The proper time therefore

164 OF THE FISTULA IN ANO.

to make the opening, is when the tumor is red, œdematous, and retains the impression of the finger. We may then be certain that some *pus* is formed, which is generally very serous, and of an ill smell. Every hour the incision is delayed after this, the matter increases in quantity, by the dissolution of the fat and the cellular membrane. I have seen instances where the *rectum* has been denuded, and sodden, as it were, in the *pus*, which had stript it all round; and the neck of the bladder has sometimes suffered in the same manner for want of having had timely recourse to the operation.

In order to perform this operation, the patient must lie at the edge of the bed, upon the side affected, with his knees bent, and held by an assistant: I then pass the knife or lancet into the tumor, on the side of the *anus*, till it reaches the *pus*, and I make an incision sufficiently large, being directed as to the length of the outward opening by the extent of the œdematous swelling. This done, I introduce the forefinger of my left hand, either to break the membranous bridles that remain (for the *pus* does not destroy them all) or to guide the scissars to such of them as cannot be separated by the finger. Upon opening these large abscesses, we frequently discover sinuses which run a great way up along the *rectum* and towards the bladder, into the cellular substance that invests these parts. These sinuses, one would imagine, should render the disease incurable, as they penetrate deeper than the finger can reach; but we find by experience, that they almost always fill up within the first six days; or, to speak more properly, the flesh closes again, having only been separated by the *pus*, and not destroyed. But
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supposing the opening them was practicable, it would occasion a great loss of substance; and for this reason, as well as the preceding, they ought not to be meddled with, but, after having divided all the membranous bridles, we should content ourselves with making the outward opening sufficiently large, and take off part of the lips to make the application of the dressings more easy. After some days, that is, as soon as the flesh is closed as much as nature will admit, if any *sinus* remains, we may lay it open to the wound by an incision, provided the bottom is within the reach of our finger.

UPON opening this sort of abscess, we always discover the *rectum* bare, that is, the *pus* fluctuates against its external membrane: this is owing to the dissolution of the fat; and as there is most of this adipous substance on the sides of the gut, it is there we generally find it denuded. The intestine may be bare, either on one side only or both, without its being so anteriorly towards the *urethra*, or posteriorly towards the *os sacrum*; and it may likewise be denuded all round. If it happens only on one side of the gut, the denuded part must be cut out, otherwise the wound will certainly become fistulous. If only a simple incision was to be made through it, the divided parts would hang floating in the wound, and render it very difficult to apply the dressings, and perhaps occasion a *fistula*. If the intestine is bare on both sides, we ought, in order to preserve it, to make a counter-opening in the other buttock, near the verge of the *anus*, of a sufficient length to let the dressings be easily applied; and then wait to see what nature will do. If the intestine is bare all

166 OF THE FISTULA IN ANO.

but no higher up than the *levator ani* extend, the denuded part must be entirely extirpated.

THIS large wound is to be dressed at first like other wounds; but when the flesh begins to close, it requires a more particular care, without which the *anus* would become so straight as not to suffer the excrements, if they were at all hard or large, to pass. To prevent this inconvenience, we must introduce into the *rectum*, a smooth linen tent of a sufficient length and bigness to keep open the passage; and at the conclusion of the cure, supply the place of the tent with an ivory suppository made hollow like a *canula*, taking care to secure it from coming out, with a proper bandage. It will be necessary to continue the use of this suppository almost a year after the wound is healed, as the *cicatrix* would otherwise contract the *anus*.

Of middle-sized or small Abscesses.

WE proceed now to small abscesses, which sometimes degenerate into *fistulae*. Some of these, as was before observed, arise from a pile, the middle of which inflames and suppurates. Of these abscesses, some open into the intestine, and have only one *sinus*, which extending itself between the coats of the gut, penetrates more or less upwards; others have no *sinus* at all.

THE cure of these abscesses is easily accomplished, the whole of the operation consisting in making an incision into the pile: if there is a *sinus* which runs between the coats of the *rectum*, it must be opened its whole length; and this likewise is easily cured by simple dressings.

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THERE are also other abscesses formed in an hæmorrhoid, which pierce the external coat of the intestine. In this case the matter works itself sinuses in the adjacent fat till it makes its way out through the skin. These may be ranged amongst the blind, external *fistulae*.

I TOOK notice before, that the abscesses formed in the fat investing the *rectum*, are either of a middle size or small. Those which may be termed of a middle size, are yet sufficiently painful to induce such as suffer from them to apply for help. If, upon dilating these abscesses, the gut does not appear denuded, all we have to do is, to continue the incision the whole length of the abscess, in order to allow the dressings to be properly applied. But, if the *pus* has left the intestine bare, these abscesses must not only be opened their whole length, but the part of the intestine which is denuded must be cut away, performing the operation in the same manner as we shall hereafter direct for a blind *fistula*. It is proper to observe, that though the gut be bare only in one particular part, yet that is sufficient to render the wound fistulous, and therefore it is incumbent upon the surgeon to examine well into this. If these abscesses are opened imperfectly, or if they open either of themselves, or by the help of maturative plasters, a *fistula* will necessarily be the consequence: an internal, blind *fistula*, if the abscess penetrates into the intestine; an external, blind *fistula*, if it makes its way through the skin on the side of the *anus*; and a complete *fistula*, if the matter passes both ways, as frequently happens.

THE very small abscesses are so little painful, that most patients take the slight twinges they feel from them, for the effects of the piles: the

168 OF THE FISTULA IN ANO.

abscess breaks, and they think themselves cured; but in a short time after, they find they have either a blind or a complete *fistula*, according as where the matter breaks through.

CURE. I have known *fistulae* cured by the use of caustics, with which all the callosities were destroyed; but this method is so unsafe, so tedious, and, for a considerable time, so uncertain, that it bears no comparison with the surgical operation, and therefore I would never advise it.

THE operation consists in two things; first, to make the entrance of the *fistula* considerably larger than the bottom; secondly, to extirpate all the callosities, or at least to put them in a way to be dissolved by suppuration.

IF it be a blind *fistula*, we must begin by making it a complete one: that is, if the opening is in the *rectum*, we must make an orifice through the skin; if it is outwards, we must do the same in the *rectum*.

WE will suppose it to be in the *rectum*. In this case, authors propose to introduce the finger into the *anus*, and by the help of that, to convey a sharp-pointed probe, through the fistulous opening, into the cavity of the abscess, and bring it out through the external skin; by which means the probe itself will make the necessary opening on the outside. This is very plausible, but hardly ever practicable; for which reason I should prefer the following method.

HAVING lubricated my forefinger with oil or pomatum, I introduce it into the *rectum*, as high as the callosity reaches, and press the end of the finger upon this callosity. I then pass a lancet or bistory through the skin to the centre of the callosity, the finger that remains in the *rectum* serving

ing as a guide; and, in drawing out the instrument, I enlarge the external opening, and thus the *fistula* becomes a compleat one.

After this I convey a hollow blunt-pointed probe between the callosities, and search for the passage that leads to the opening in the intestine. Whether I discover it with this or not, directing it to be held by an assistant, I run a sharp-pointed probe along its groove, and then withdraw the former. The hollow probe may be looked upon, perhaps, as useless, and tending rather to prolong the operation; but, on the contrary, we shall find it of great service. If we were to introduce the sharp-pointed probe at first, the point might stick in the flesh, and prevent us from conveying it to the bottom of the *fistula*; whereas the blunt probe goes on in the right direction, and will not be liable to make any new passage. The sharp-pointed probe being introduced, I do not offer to pass it through the fistulous opening that is in the *rectum*, as by that means I might leave some callosities above it, which might hinder the wound from healing; but I perforate the *rectum* above the callosities, which by my finger I had discovered there, and with the same finger bring out the end of the probe with which I perforated the intestine; so that the probe will make a sort of loop including all or the greatest part of the callosity, which we are to extirpate intirely with a bistory. This done, I introduce my fore-finger into the wound, and if I meet with any membranous bridles, I divide them with the scissars; if there are any sinuosities, I dilate them; if any callosities left behind after the first incision, I either extirpate them, or make several scarifications into them with the bistory, in order to bring them to suppuration. To conclude,
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170 OF THE FISTULA IN ANO.

we are to manage so, that the bottom of the wound is laid quite open, and makes, in a manner, but one and the same cavity with the remaining part of the intestine. If the outward opening proves too small, in proportion to the bottom of the wound, to allow of dressing it conveniently, and without pain, I enlarge it by an incision directed towards the buttock, and cut off the angles at the circumference of the wound.

PREVIOUS to every incision that is made, either with the knife or scissars, at the bottom of the wound, we should examine with the finger, whether we can feel the pulsation of any considerable branch of an artery, in order that we may avoid dividing it: if any one should be opened, it will occasion a considerable hæmorrhage, which must be stopt as soon as possible. It is frequently very difficult to discover whence the hæmorrhage arises, and, unless we can see the orifice of the vessel, there is but one way to distinguish where it is, and that is, by pressing the finger upon several parts of the wound, and when the blood ceases to flow, it is a sign the finger is upon it.

THOUGH several methods have been proposed to stop the hæmorrhage upon this occasion, yet, for my own part, I know but one which can be relied on, and that is, if the vessels be considerably large, to apply a small compress, dipt in some strong styptic water, upon the opening, and to have it kept there a few minutes with the finger, to give time to the styptic to form an eschar. This done, we are to keep on the compress with some more lint and the rest of the dressings. If, to spare ourselves the trouble of holding on the compress, we only support it at first with dossils, what is done to secure it often serves rather to
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displace

OF THE FISTULA IN ANO. 171

displace it; and the blood that extravasates gets up into the *rectum*, and collects there, as may be known by the noise which the patient perceives in his belly, likewise by the lowness of his pulse, and faintings: in this case the dressings must be all taken off, and the hæmorrhage stopt in the manner above directed.

THE wound requires nothing afterwards more than any other simple wound, except in the manner of applying the first tent or doffil. If either of these be introduced into the bottom of the wound, without proper care, there will be danger of hurting the intestine at the part that has been cut, or perhaps of making a new passage between the gut and the fat; which would hinder the wound from healing. It must be applied therefore with care; and, in order to do it properly, we must put the fore-finger of one hand into the *rectum*, somewhat higher than the wound, in such a manner as to cover it, and afterwards introduce the tent or doffil between this finger and the sound part of the intestine. Upon drawing away the finger, the head of the tent will be in the wound, whilst the other extremity will reach into the gut itself, above the wound. The same care must be taken at every dressing, and upon drawing out the tent at these times, we may know it was well placed, if the end of it is tinged with excrement.

THE tent being rightly applied, the rest of the wound is easy to dress.

THE operation in a blind, external *fistula* has this difference only, in the introduction of the probe: in an internal blind *fistula*, we must begin by thrusting the finger up the *rectum*; in the external, by introducing the probe first, because the bulk of the finger passed through the *anus* into the

172 OF THE FISTULA IN ANO.

the intestine, is liable to change the direction of the fistulous *sinus*, and thereby to render the introduction of the hollow probe somewhat difficult; but the probe being once introduced, the rest of the operation is performed in the same manner as was before directed.

THE like method is also to be observed in a complete *fistula*.

THE patient cannot be enjoined too spare a regimen; for each time he goes to stool the dressings must be renewed; and we should further endeavour, by the choice of his diet, to prevent a looseness, which might otherwise ensue.

MEN are sometimes troubled with a retention of urine after the operation, which may be owing to the *urethra* being compressed by the lint; or it may proceed from a slight inflammation extending from the wound to the neck of the bladder. Bleeding once or twice abates the inflammation, and, till it is quite removed, the patient should admit the *catheter*, by which means a free course is given to the urine that is in the bladder. Sometimes putting the patient upon his knees, is sufficient to facilitate the passing of his urine without probing him.

THE subsequent dressings differ nothing from the general rule, and therefore it is needless to give any further account of them.

Of the HÆMORRHOIDS.

THE Hæmorrhoids are certain excrescences arising about the verge of the *anus*, or the inferior part of the *intestinum rectum*.

THE *rectum*, as well as the *colon*, is composed of several muscular membranes, connected to each other by an intervening cellular substance; and as the muscular fibres of this intestine always tend, by their contraction, to lessen its cavity, the internal membrane, which is very lax, forms itself into several *rugæ*, or folds. In this construction nature respects the use of the part which occasionally gives passage to, or allows the retention of, the excrements; the hardness and bulk of which might produce considerable lacerations, if this intestine was not capable of dilatation. The arteries and veins subservient to this part are called hæmorrhoidal, and the blood that returns from hence is carried to the meseraic veins.

THE *intestinum rectum* is particularly subject to the hæmorrhoids, from its situation, structure, and use; for whilst the course of the blood is assisted in almost all the other veins of the body, by the distention of the adjacent muscles, and the pressure of the neighbouring parts, the blood in the hæmorrhoidal veins, which is to ascend against the natural tendency of its own weight, is not only destitute of these assistances, but is impeded in its passage: for, first, the large excrements which lodge in this intestine dilate its sides, and the different resistances which they form there, are so many impediments obstructing the return of the blood; not in the large veins, for they are placed

placed along the external surface of the intestine, but in all the capillaries which enter into its composition. Secondly, as often as these large excrements, protruded by others, approach near the *anus*, their successive pressure upon the internal coats of the intestine, which they dilate, drives back the blood in the veins, and for so long suspends its course: the necessary consequence of which is, a distention of the veins in proportion to the quantity of blood that fills them. Thirdly, in every effort we make, either in going to stool, or upon any other occasion, the contraction of the abdominal muscles, and the diaphragm pressing the contents of the *abdomen* downwards, and these pressing upon the parts contained in the *pelvis*, another obstruction is thereby opposed to the return of the blood; not only in the large veins, but also in the capillaries, which being of too weak a texture to resist the impulse of blood, that always tends to dilate them, may thereby become varicous.

THE dilatation of all these vessels is the primary cause of the hæmorrhoids; for the internal coat of the intestine, and the cellular membrane which connects that to the muscular coat, are enlarged in proportion to the distension of the vessels of which they are composed. This distension, not being equal in every part, produces separate tumors in the gut, or at the verge of the *anus*, which encreases according as the venal blood is obstructed in them, or circulates there more slowly.

WHATEVER, then, is capable of retarding the course of the blood in the hæmorrhoidal veins, may occasion this disease. Thus persons that are generally costive, who are accustomed to sit long

at stool, and strain hard; pregnant women, or such as have had difficult labours; and likewise persons who have an obstruction in their liver, are for the most part afflicted with the piles: I say for the most part; for though every body has the hæmorrhodial vessels, every body, however, has not the hæmorrhoids; the different causes, which I have before mentioned, being not common to all, or at least not having in all the same effects.

WHEN the hæmorrhoids are once formed, they seldom disappear intirely; and we may judge of those within the *rectum* by those which being at the verge of the *anus*, are plainly to be seen. A small pile that has been painful for some days, may cease to be so, and dry up; but the skin does not afterwards retain its former firmness, being more lax and wrinkled, like the empty skin of a grape. If this external pile swells, and sinks again several times, we may perceive, after each return, the remains of the pile, though shrivelled and decayed, yet still left larger than before. The case is the same with those that are situated within the *rectum*: they may happen indeed never to return again, if the cause that produced them is removed; but it is probable that the excrements may in their passage occasion a return of the swelling, to which the external ones are less liable; for the internal piles make a sort of knots or tumors in the intestine, which straightening the passage, the excrements, in passing out, occasion irritations there, that are more or less painful in proportion to the efforts which the person makes in going to stool; and it is thus these tumors become gradually larger.

176 OF THE HÆMORRHOIDS.

THE hæmorrhoids are subject to many variations; they may grow inflamed from the irritations beforementioned, to which they are exposed; and this inflammation cannot always be removed by art.

In some, the inflammation terminates in an abscess, which arises in the middle of the tumor, and degenerates into a *fistula*, if not prevented by the means already directed in treating of the cure of *fistule*. These piles are very painful till the abscess is formed.

In others, the inflammation terminates by an induration of the hæmorrhoid, which remains in a manner schirrous. These never lessen, but must necessarily grow larger. This *schirrus* sometimes ulcerates, and continually discharges a *sanies*, which the patient perceives by stains on his shirt, and by its occasioning a very troublesome itching about the verge of the *anus*. These kind of hæmorrhoids sometimes turn cancerous.

THERE are some hæmorrhoids, and those of different sizes, which are covered with so fine a skin as frequently to admit blood to pass through. This fine skin is only the internal coat of the *rectum*, greatly attenuated by the varicous distension of its vessels; and the hæmorrhage may proceed from two causes; namely, either from an excoriation produced by the hardness of the excrements, or from the rupture of the tumefied vessels, which break by their too great distension.

In some of these the patient voids blood almost every time he goes to stool; in others, not so constantly. We sometimes meet with men who have a periodical bleeding by the piles, not unlike the *menfes* in women; and as this evacuation, if moderate, does not weaken the constitution,

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we may infer that it supplies some other evacuation, which nature either ceases to carry on, or does not furnish in due quantity; and hence also we may explain, why the suppression of this discharge, to which nature had been accustomed, is frequently attended with dangerous diseases.

THE hæmorrhoids are sometimes distended to that degree as to fill the *rectum*; so that if the excrements are at all hard they cannot pass. In this case the excrements force the hæmorrhoids out of the *anus*, to procure a free passage, consequently the internal coat of the *rectum*, to which they are connected, yields to extension; and upon examining these patients immediately after their having been at stool, we shall find part of the internal coat of that gut forms a sort of ligature or stricture round the hæmorrhoids. A difficulty will occur in the return of these in proportion to their size, and as the verge of the *anus* is more or less contracted. If the bleeding piles come out in the same manner upon going to stool, it is then they void most blood, because the verge of the *anus* forms a kind of ligature above them.

I HAVE already taken notice that the hæmorrhoids vary according to their different nature, whence proceed diseases which resemble each other only in name; for this reason we cannot treat properly of their cure, without mentioning the several kinds of them in their order. I will begin with those that are at the verge of the *anus*, and are recent.

THESE piles form either one or more little red knots or tumors, which are hard, painful, and subject to itch. The pain is less violent

if the tumor is quite external, than if enclosed and compressed by the verge of the *anus*.

In this case there are three indications to be answered. First, to evacuate by bleeding, since every pile always implies, if not a *plethora*, an obstruction of the hæmorrhoidal vessels, where the blood finds it difficult to ascend in opposition to the natural tendency of its own weight. Secondly to empty the intestines (where probably some hard excrements being retained, may occasion the compressions before-mentioned) with cooling laxatives, such as *cassa* infused in whey, and given either as a draught or clyster. Thirdly, to abate the inflammation, by emollient cataplasms and other softening applications, as *pomatum*. Sitting over hot steams is likewise a very efficacious remedy.

THE hæmorrhoids, at their first appearance, may generally be cured by these means, but the vessels, as was before observed, remain varicous, and larger than they are in a natural state; and if, by a frequent return of the inflammation, this pile at last becomes schirrous, the patient will never recover, unless it is extirpated. If a small abscess is forced here, it must be properly opened, or it will leave a *fistula*. If it become turgid with blood, so as to form a black-coloured bladder like a grape, it must be opened with a lancet to let out the blood that is there obstructed. This slight evacuation generally unloads the neighbouring vessels, and for a time puts an end to the distemper. Nature points out this remedy by the bursting of this bladder sometimes spontaneously, and thereby intirely discharging its contents.

OF THE HÆMORRHOIDS. 179

I PROCEED now to speak of those hæmorrhoids that are situated within the *rectum*. These are seldom felt whilst they continue small, and one may have them a long time without being sensible of them: but when, by growing larger, they begin to straiten the passage of the excrements, the least inflammation causes a heat and pain there; not very violent indeed, but very disagreeable by its continuance, from the pressure of the excrements. This pain increases upon the patient's going to stool, when a certain quantity of hard excrements force their way through successively, and by the irritations thereby occasioned, the hæmorrhoids grow still larger, and then admit of other variations.

THOSE which void much blood, by a repeated discharge, whenever the patient goes to stool, or by a periodical evacuation, to which nature is accustomed, may be looked on as beneficial; and daily experience verifies that aphorism of *Hippocrates*, which forbids the doing any thing to suppress this discharge: for we find that such persons as have been subject to it, if it disappears (from whatever cause that happens) are soon after seized with some distemper. If therefore it ceases, we must supply the want of it by some other evacuation: for which purpose, some propose bleeding in the arm or foot, and this has often proved useful; but I have known the application of leeches to the verge of the *anus* more effectual. In short this last method supplies the defect by the evacuation of those individual vessels of which nature had made choice. It is true, three or four leeches do not draw away much blood; but after they are fallen off, the patient should be put upon a close-stool, with warm water in it, and the orifices

made by the leeches, will bleed as long as he continues in that situation; and thus you may take away twelve ounces of blood in an hour's time.

THIS daily or periodical evacuation, however, ceases to be beneficial when it becomes violent, as it is liable to weaken the patient; and hence some have fallen into a *marasmus*, have been seized with a looseness, or have become dropical.

IN this case, bleeding in the arm may prove very serviceable, in the same manner as it suspends or stops the flooding in women.

To this must be added the use of an incrassant diet, and such remedies as may prevent that great poverty and dissolution of the blood, which is the consequence of this excessive evacuation.

As to slight discharges of blood, proceeding from the accidental excoriations of the hæmorrhoids by the excrements; as they are not useful to nature, they may be suppressed without danger.

THE blind hæmorrhoids, or those which do not bleed, require the more attention, as they daily grow larger for the reasons before-mentioned, and gradually distending the internal coat of the *rectum*, will at least appear externally. These causes of their growth direct us in their method of cure, it being certain, that by the removal of these different causes, the piles will lessen, and at length disappear. This may be done by bleeding, a proper regimen, and suitable topics. By bleeding, in proportion to the strength and constitution of the patient, the mass of blood will be diminished, and as the general plentitude is abated, the hæmorrhoidal vessels will become less full, and their obstruction may be thereby removed. It is easy to prevent the too hard excrements from compressing

pressing the coats of the *rectum*, and from irritating the piles, that are formed there, in their passage. For this end it is sufficient either now and then to give some gentle laxative, as pulp of *cassia*, or by clysters to soften and thin those excrements, which are too hard to pass without making the patient strain. Hogs lard only, being melted and injected into the *anus* through a small syringe just before going to bed, will moisten and soften the excrements so as they may be excluded in the morning without pain. I have often known patients relieved in such a manner by these precautions continued for several months, that they looked upon themselves as cured; for which reason I cannot too much recommend the use of them.

AN exact regimen is likewise very essential. I have seen piles so much swelled as not to admit any passage through the *anus*. In these cases, I have kept the patient in bed for six or seven days, to prevent the excrements by their weight from falling down upon these piles; and made them live only upon a little broth, that they might form but a small quantity of excrement. By these means, I have known the hæmorrhoids cured for a long time without any return: nor will this appear surprising, if we reflect that the irritation occasioned by one single stool, which the patient may chance to have in twenty-four hours, does more mischief in this case than the application of the best topics can do good between one stool and another.

IF, for want of these precautions, the piles at last push out upon going to stool, they generally continue to do so every time the patient has occasion; and at length being very much swelled and

distended, it is with no small difficulty they are put up again: nay, it has sometimes happened that it being absolutely impossible to make them re-enter, a gangrene has supervened, by the verge of the *anus* forming a kind of ligature above them.

WHEN, therefore, they are accustomed to appear externally, the patient can never be cured, unless they are extirpated either by ligature or incision.

THE shape of the hæmorrhoid ought to determine us which of these two methods to chuse. In some, the *basis* is much narrower than the superior part; others hang like a pear, by a sort of stalk formed of the vessels which produce them. In both these cases the ligature is preferable, as this method occasions no hæmorrhage, and when the ligature falls off, the patient finds himself cured with hardly any mark of a wound remaining: but if the *basis* of the pile is large, I rather chuse the knife. We might indeed use the ligature here, and I have frequently known it done, but there are two reasons which induce me to prefer incision. First, the terrible and almost intolerable pain caused by the ligature for five or six hours. Secondly, the varicous swelling that remains in the internal coat of the gut and the cellular substance where the pile was attached, which swelling, when we use incision, goes off by the succeeding suppuration.

IF the piles never appear externally, unless when the patient goes to stool, we must either take that opportunity to perform the operation, or give him a clyster to promote a stool and make them come out. Supposing the patient to have been prepared by bleeding, and a proper regimen for some days, if the piles are on both sides, I place the patient
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OF THE HÆMORRHOIDS. 183

on the bed-side, lying on his belly, with his feet on the floor. If they are on one side only, he must lie on the side affected. The buttocks being then separated and held so by assistants, I take care to distinguish the piles from the stricture formed round them by the internal coat of the gut; and if there are several of them, I take hold of each with an errhine, or hook, which I direct to be held by the assistants. I afterwards take the errhines one after another, and with a single stroke of the scissars cut away the pile at its root, doing the same by the rest successively. If they were not all secured at first by the errhines or hooks before-mentioned, the pain occasioned by cutting the first would cause a contraction of the *anus*, and the others might re-enter without giving time to lay hold of them.

THEY bleed more or less according to the size of the artery which supplies them, and the blood either flies out in a stream, or discharges from the whole *basis* of the pile, as from a sponge when squeezed.

If the blood flies out, we must lay a small compress dipt in styptic water upon the artery from whence it issues, holding it on with the finger an hour or two, and not apply the other dressings till afterwards; nor must this small compress be then removed, but should be kept upon the artery with dossils of lint, compresses, and the T bandage.

It is equally necessary to stop the hæmorrhage, if the blood discharges in the other manner; for which purpose, if we have cut several piles, we must put a large dossil of lint, tied with a thread, between the wounds, and introduce it into the *anus*, with as much as possible to the internal coat

184 OF THE HÆMORRHOIDS.

of the intestine that formed the stricture. This stricture will sometimes go in again at once; at others, will require some days before it is quite returned. When the piles are out, and cannot be returned, if they appear the least black, they must be immediately cut, for otherwise both them and the stricture would soon become gangrenous, because of the strangulation caused by the verge of the *anus* above them. The operation is to be performed in the manner as before directed.

THE dressings for the incisions are the same as for other simple wounds. Every time the patient goes to stool, or once in four and twenty hours, we must introduce into the *anus* a fresh doffil of lint, armed with a digestive to bring off the sloughs. When this purpose is answered, which may be known upon the patient's going to stool, it will be sufficient afterwards to throw up some vulnerary and deterfive injections, and in a few days the wounds will cicatrize.

It would be proper for the patient during this time, and even for some days after his cure, to be cautious as to his diet; and to continue the use of clysters, that, by preventing a distension of the parts, the cicatrix may strengthen and confirm the cure.

Of the S T O N E, and of the Diseases thereby occasioned.

PETRIFICATIONS are so common in the productions of nature, that we need not wonder they occur sometimes in the human body. We have had frequent instances of infants who have been almost entirely petrified in the mother's womb; and in the year 1625, a child was born at *Pont au Mousson* who had one shoulder petrified, and some of its *viscera* turned into a kind of gravelly substance. When these petrifications become thus in a manner general, they obstruct the motions both of the solids and fluids, in proportion as they are formed and increase; and for this reason these children have always been found dead. But the case is different as to the petrifications formed in particular parts of the body, since if these bring on the destruction of the machine, it is by the diseases they occasion.

WE often see stones of different kinds formed in several parts of the body.

SOME are formed in the lungs; and these are generally whitish, light, and friable. I knew a person who expectorated stones of this kind, and as large as millet-seeds, for many years. See my *Observations*, p. 128.

OTHERS are formed in the gall-bladder, which is sometimes filled with several stones; and I have known it intirely filled with a single one. These stones, though formed of a bilious and bituminous substance that burns like camphire, are hard, though light, and either of a yellow, green, or brownish colour.

SOME

SOME breed in the joints of gouty persons, by the coagulation of the *synovia* : these are whitish and friable.

SOME are formed in the *sacculus lacrymalis*, and these are pretty hard.

OTHERS are found in the glands in various parts of the body ; and are of a nature analogous to the fluids which are separated by these glands. Thus some are bred in the kidneys, which are sometimes filled with them. These are not always of the same solidity ; being sometimes hard, sometimes soft and friable. Some are smooth, others rough.

SOME we find which fill the *ureters*, and, from their taking exactly the figure of that canal, seemed to have been produced there.

WE likewise find stones in the prepuce of children, who have a *phimosis* ; others in the urinary bladder, the *perinæum*, and *urethra*.

NATURE, who, in the œconomy of the whole world, follows one certain course prescribed by the Great Creator, may equally and by the same causes produce within our bodies, as well as in the earth, all these petrifications, which consist only in the peculiar disposition of matter ; and as there are some soils, more abounding in stones of various kinds, to which the nature of the waters that pass through them greatly contributes, so also there are some bodies more subject to stony concretions than others, which may be ascribed to the nature of their blood.—This is the more probable, as we frequently find this distemper to be hereditary. I confess however it is not always so, and may arise in the course of a man's life by an abuse of the non-naturals. And here I might examine into the various opinions that have been advanced about

OF THE STONE. 187

about the causes of these petrifications, or the different principles of which these stones are formed; but this point, though physical, is liable to many disputes; and therefore I shall only shew you, in a few words, in what manner they are formed in us. I put some urine into a vessel, and let it settle there: as the moisture evaporates, we find a gravelly incrustation that sticks to the sides of the vessel, and at last a kind of mortar subsides to the bottom, which, when dried, is of the same nature with the stone. The like experiment may be made with all the fluids that are secreted from the blood. This is a sufficient reason to induce us to believe, that the formation of a stone is owing to the union of the saline, sulphurous, and earthy particles; in a word, of all the solids that enter into the consistence of any liquid whatever.

WHAT is performed in the vessel, is performed also in us, as well from the nature of our fluids, as the disposition of the parts affected.

THE nature of the fluids causes the difference between one stone and another; and therefore those which are formed in the gall-bladder, the lungs, kidneys, &c. being formed by different fluids, appear also evidently of a different nature. Nay more, the same sort of fluid, as the urine for instance, being altered by various circumstances, produces stones very different from each other; as we see in those in the kidneys and bladder; and undoubtedly it is from hence we find, that what dissolves one stone has no effect upon another.

BUT though the different principles of the fluids produce the stone, it is the disposition of the parts affected, which occasions the concretion of these principles, by allowing those fluids to flow very gently,

gently, or even to stagnate; for it is not in the vessels these stones are formed (the fluids pass too impetuously through them), but in the gall-bladder, the lungs, the kidneys, the urinary bladder, &c. cavities where the fluids slacken in their motion.

STONES therefore may be formed in any part where the fluids are not in motion, or where they circulate but slowly. As soon as the *nucleus* is made, the stone increases gradually by the supply and apposition of fresh matter; that is, new *strata* are successively formed, as may be discovered by breaking some of the stones that have been extracted out of the bladder; when you may distinguish these *strata* to be more or less thick, and sometimes a little different from each other, as if formed of different principles. The number of these *strata*, and their thickness, determines the size of these stones; and the quality of the slime, of which they are formed, determines their quality, hardness, and weight. The soft stones grow quicker than those which are hard; and it is observable that the soft are almost always angular, whereas those which are hard are generally round or oval.

WHEN there is a single stone only, its surface is never very smooth; but if there are two, they rub against each other, and one side of each is polished; but if each side of both stones is smooth, it is highly probably that there are more than two stones.

Of Stones in the gall-bladder.

THE gall-bladder is shaped like a pear, large at the bottom, and very small towards its neck, where

where there is a kind of sphincter. It is connected to the concave side of the liver, and serves as a reservoir for part of the bile. This bile empties itself into the *duodenum*, through the cystic duct which unites with the neck of the gall-bladder.

THE choler or bile which lodges there, frequently inspissates and produces stones. These stones are all bituminous, and inflammable like camphire; but as this bile is often different in different persons (as may be easily seen by opening several gall-bladders), so the stones likewise that are formed there do in some particulars differ. Sometimes also we find so considerable a quantity, that the gall-bladder is almost full of them; and in this case they are always angular.

It is seldom that these sort of stones occasion any sensible indisposition; and therefore, as long as they create no disorder, we have no particular signs whereby to discover them. But they may, however, happen to produce complaints, and experience points out to us several which may result from thence: as, first, the stoppage of a stone that has lodged itself in the neck of the gall-bladder; which stoppage occasions colics, attended sometimes with dangerous consequences, as they are seldom free from an inflammation. These are called hepatic, but ought rather to be termed cystic colics. The second is what has been named the dropy of the gall-bladder, but which might more justly be stiled the retention of the bile; as the stoppage of the urine, when it cannot pass out of the bladder, is called the retention of urine.

If the stone is lodged in the neck of the gall-bladder, its continuance there is the more painful, as it is a hollow muscle that always inclines to contract

contract itself; in this case, it squeezes and presses upon the stone, which, by its hardness and irregular shape, irritates it more and more. Hence proceed violent pains between the navel and the *cartilago xiphoides*. I have known these pains cease and return again by intervals, like those a person feels who has a stone in the bladder, which cease for a time, after he has made water, and return again whenever the bladder contracts itself to expel a few drops of urine. Hence likewise is produced the convulsion which affects all the neighbouring parts; also the acute fever, the inflammation, with numberless other symptoms that ensue, and which never cease, till the stone changing its situation, either returns again into the gall-bladder, or passing from thence, and making its way through the cystic duct, falls at last into the *duodenum*.

THESE symptoms serve us as diagnostic signs, which are not however altogether certain, since an inflammation alone might produce them, without the intervention of a stone; but we have no others at the beginning of the distemper, and the same remedies are indicated in either case.

THE only means of making the stone change its situation is by removing the inflammation, and bringing on a general relaxation of the parts affected; for which purpose we must bleed the patient frequently and largely, having a regard at the same time to his strength, and the degree of the symptoms; adding oily draughts, emollient cataplasms, and, in a word, all that is likely to abate the convulsion which produces all these symptoms; and if by this method the stone is at last brought to change its situation, the pain ceases

OF THE STONE. 191

all at once, and so sudden an alteration ensues that the patient imagines himself cured.

If the stone gets again into the cavity of the gall-bladder, it is no longer felt; but the patient is liable to a return of the diseases from the same cause as before. If it has passed into the *duodenum*, we are sure to find it after some days, as it will follow the direction of that gut, and be excluded with the excrements. It is, however, very surprising that such stones as I have seen, as large as apricot stones, should be able to pass through the neck of the gall-bladder, and the cystic duct.

SOMETIMES the bile cannot pass out of the gall-bladder. The bile contained in the gall-bladder is designed to pass into the *duodenum*; now every thing that is capable of preventing this, whether it be part of the bile inspissated in the neck of the gall-bladder, or the cystic duct, or whether it be a stone that lodges in the neck, or in that duct; all these may produce so great a distension of the gall-bladder, that it has sometimes projected in the forepart of the epigastric region, in the same manner as the urinary bladder does, when too full, in the forepart of the *hypogastrium*. This distention of the gall-bladder may happen but slowly, and by degrees, and in that case is not attended with very bad symptoms; which has induced some practitioners to stile it a dropsy of the gall-bladder.

THE only signs we have to discover this disorder, is the protuberance in the forepart of the epigastric region, and the fluctuation that may be felt under the finger. I have observed, upon a gentle pressure of the finger on this part, in order to find out the nature of the tumor, that it has suddenly disappeared. Undoubtedly what obstructed the passage

sage of the bile gave way immediately upon being pressed; for we afterwards found the bile passed very plentifully through the intestinal canal, whereas before it only passed in a very small quantity, as was evident from the colour of the excrements.

THIS disease is the more difficult to be cured, as we cannot readily discover what it is that prevents the passage of the bile out of the gall-bladder; and consequently none but general remedies can be proposed to remove or prevent symptoms, the cause of which is undetermined. It has been proposed to make a puncture in the gall-bladder with the *trocár*, in order to empty it, as the puncture is made in the urinary bladder, in such retentions of urine where we cannot pass the *catheter*; but the case is by no means the same here. In the latter instance, the puncture is made either in the *perinaeum*, or above the *os pubis*, and the *trocár* is introduced into the bladder to discharge it of its contents; but the bladder is attached in these parts by a cellular membrane, and is the first cavity which the *trocár* enters, after it has gone through the skin. The urine therefore that passes afterwards into the bladder, through the *ureters*, cannot be diffused in any other cavity. The gall-bladder is differently circumstanced, as it does not adhere to the *peritoneum*, and therefore supposing it emptied by a puncture, which is easily done, the opening that is made there not closing immediately, would suffer the fresh bile to pass out, and diffuse itself in the cavity of the *abdomen*. We must be assured then, in order to make this puncture safely, that the gall-bladder, by being inflamed, is become adherent to the *peritoneum*, which we may imagine to be the case, if there is an inflammation of the teguments.

WHEN

WHEN the preternatural distension of the gall-bladder happens on a sudden; it is attended with acute pains, a fever, and an inflammation. It may then contract an adhesion with the *peritonæum*; in which case that and the *peritonæum*, by their adhesion making but one, have been known to open, and afford a passage for stones or bile into the cellular membrane that connects the *peritonæum* to the muscles: these extraneous substances, exciting an inflammation in the parts where they lodge, produce a *phlegmon* that terminates in an abscess; and, upon opening it, we discover bilious stones, and frequently a cavity which communicates with the gall-bladder, and through which the gall passes.

THESE are to be dressed like other abscesses; but there is great room to apprehend they will end in a *fistula*, and this for two reasons; first, the difficulty of applying proper remedies to the opening in the gall-bladder, and procuring its reunion. Secondly, this cavity being generally complicated with sinuses that are frequently difficult to discover, the bile concretes there, and produces other small stones, which cannot be perceived till grown larger.

Of Stones in the lungs.

THE formation of stones in the lungs is not a common disease, but I have known two instances of persons who often discharged them by expectoration. These stones were undoubtedly formed by the inspissation of the lymph that is continually secreted by the glands of the lungs, and which, instead of being expectorated, thickened in some

of the *bronchi*, and concreted. The stones in the two instances beforementioned, were of an irregular figure, and, pricking the membranes by their asperities, caused violent coughs. They were expectorated at last by coughing; but in passing the *bronchi* in their way to the *larynx*, they occasioned excoriations, which brought on a spitting of blood. These stones, by greatly irritating the lungs, may produce an inflammation there, and even a suppuration. See my *Observations*, p. 128. The only means of changing this disposition in the blood to form stony concretions, is, by a proper diet to change the nature of the fluids in general.

Of Stones formed in the sacculus lachrymalis.

THE *sacculus lachrymalis* is a kind of reservoir, very narrow, and situated in the great angle of the eye. The tears which enter it through the *puncta lachrymalia*, are immediately conveyed into the nose by the *ductus nasalis*. The structure of this *sacculus*, its situation, and the almost continual motion of the parts about it, will scarce allow the tears to remain there, and accordingly in its natural state they do not lodge, nor are any stones bred in it; but, if they stop by any disorder of the part, this sac becomes a little dilated, and continues to dilate itself insensibly, so as to form what is called a flat *fistula*, and what some have named, the dropsy of the *sacculus lachrymalis*. In this case, a stone may be formed in the sac by the tears lodging there, unless care is taken to empty it pretty often by compression; which compression forces the tears up again through the *puncta lachrymalia*.

IF the stone is begun to be formed, it cannot be discharged with the tears, but gradually increases; and, when it is arrived to any considerable size, is very easily discovered by its hardness. The only way of removing it is by making an incision the whole length of the *sacculus lachrymalis*, so as to extract the stone with a scoop. What remains to be done in regard to the dressings, and the cure of the *fistula*, I shall refer to the chapter of the *fistula lachrymalis*.

Of Stones that are found under the prepuce.

WE never meet with stones under the *prepuce*, but where the patient has a *phimosis*; and as this complaint is pretty common to children, so I have never observed the other to happen but in them.

SOMETIMES it was a stone which had passed through the *glans*; and not being able to make its way out of the orifice of the contracted *prepuce*, it lodged itself between the foreskin and the *glans*; at other times it was an incrustation formed at the *corona*, round the *glans*, by the stoppage of the urine, and the stone had adapted itself to the form of the *glans*. In each of these cases, the stone cannot be removed without performing the operation for the *phimosis*. See the *Phimosis*.

Of the Stones formed in the joints of gouty persons.

AS common a disease as the gout is, the cause of it remains unknown; for, to speak ingenuously, all the certainty we have about it arises from symptoms.

THERE is one kind of gout, the chief symptom of which is, the coagulation of the *synovia* that lu-

bricates the joints ; and we often see stones formed in several, and, though very rarely, sometimes in all the joints of those who are afflicted with that disease. The pains which the patient feels render the motion of the parts uneasy, and the inaction in consequence thereof still favours the propensity of that fluid to coagulate. The stones which proceed from hence seem to be of the nature of chalk ; white, pretty soft, and friable. Their figure is more or less irregular, according to the place where they are formed, and to which they adapt themselves. When they are once formed, they obstruct the motion of the joint : a fresh *synovia* concretes upon the first stone, and enlarges its bulk ; the motion afterwards is quite destroyed, and the heads of the bones being gradually forced out of the cavities where they were articulated, an incomplete luxation ensues. Thus we find these limbs at length distorted, and incapable of moving without inexpressible pain.

As long as the *capsula* of the joint remains entire, the stone continues in it and encreases ; but if the stone, by its bulk or some asperities, at last penetrates the *capsula*, it brings on a suppuration in proportion to the degree of the inflammation. This inflammation extends to the skin, and forms a small abscess between that and the *capsula* ; and whether it breaks of itself, or is opened, a number of small stones discharges from the bottom of it, with the matter.

THESE abscesses must be dressed by dropping in some green balsam that may penetrate to the bottom of the sore, which no ointment, that is less fluid than the balsam, can do. The whole must be covered with a plaster, to prevent

vent the air from coming to the internal part of the ulcer.

THE discharge will not entirely cease, because the *synovia* always yields a fresh supply of stones, and therefore it is very probable the opening will continue fistulous. If it heals up, it will break out again after some time, to give passage to fresh stones arising out of the *capsula*.

Of Stones formed in the glands.

THE motion of the fluids being very slow thro' the glands; it is not at all surprising, that stones should be formed there; and whenever the first particle of stone that is formed in them, encreases so as to be disproportionate to the excretory duct of the gland, it gradually grows larger. Sometimes these stony concretions are lodged in the tonsils, in the maxillary and sublingual glands; and oftentimes in tumors that are seated in the *abdomen*, and which owed their beginning to an obstruction of some of the glands in those parts. They have been found likewise in the *uterus*.

WHEN these stones are so situated as to be within the reach of chirurgical assistance, they may be removed either by making an opening into the gland, or else by the extirpation of it. Sometimes it happens that the gland becomes inflamed, and an abscess ensues; in which case the stone comes away with the matter. Those stones which are formed in tumors situated in either of the great cavities, cannot be removed unless they produce an abscess in the gland where they lodge, nor can the abscess be cured unless the fluctuation of the matter is plainly felt externally, so as to allow a sufficient opening to be made into it.

Of Stones in the kidneys.

THE kidneys are conglomerate glands, situated in the region of the loins. Their use is to secrete the urine, which is impregnated with many different principles, varying in the same person according to the different disposition he is in, and sometimes changing twice or thrice in the same day according to the nature of his food.

ONE would naturally imagine that the secretion of urine is made very quick from the blood, there being generally a large discharge of urine as soon almost as we have drank any diuretic liquor; and yet, upon examining the structure of the three substances which form the kidneys, it seems as if there must necessarily be a remission in the motion of the fluids, to permit its secretion; and was it possible, at one view, to see the blood run into the emulgent artery, and the urine, that separates from it, pass into the *pelvis*, I doubt not but there would be a great difference found, between the course of the blood which supplies matter for the secretion, and that of the urine separating from the blood and entering into the *pelvis*. Besides, the blood is not always furnished with a large quantity of this fluid; and it is probable that at those times, when we void least, the secretion is but very slowly made; and therefore the slowness with which the urine passes through the tubulous and mammillary substances to fall into the *pelvis*, may occasion the formation of the grits of stone which are sometimes found there, and which are undoubtedly concretions of

of the calculous principles that are found in the urine.

WE do not meet with any stones lodged in the cortical substance of the kidneys; but great numbers of stony particles are sometimes found in different parts of the tubulous substance, in the *papille*, and the *pelvis*. The figure of these stones is very irregular, and of very different forms; some being round, others angular; some with a smooth surface, and others very uneven.

NOR is it more easy to determine their size than that of stones situated elsewhere, for they increase daily: I have observed some which were very small, others as large as nuts, and yet they all seemed to have been lately formed. The smallness of these stones, and the smoothness of their surfaces, are circumstances greatly facilitating their discharge; so that, if the urine separates at any time from the blood in a large quantity, a full stream carries these stones along with it; for which reason, diuretic liquors often bring away from the kidneys a great many small stones, which, falling into the bladder, are discharged with the urine. But, if they are prevented from passing into the *pelvis*, either by their size or their uneven shape, they grow larger in the substance of the kidney, and by remaining there, are sometimes the cause of very bad disorders. The same thing will happen if they do not proceed through the *ureter* after having passed into the *pelvis*.

If these stones are originally angular, or become so as they grow larger by the accidental accession of new concretions, their angles prick and irritate that part of the kidney where they stop; and this irritation will produce an inflammation

of the kidneys, attended with a fever, a tension of the belly, and a fixed pain in the part; which pain is more or less acute according as the different parts of the kidney are affected. They will likewise occasion irregular shiverings, and convulsive motions; also a frequent inclination to vomit, and sometimes bloody urine, and these are often followed by many other symptoms.

WE are to endeavour in this case to abate the inflammation by bleeding and other remedies proper for the different symptoms. The cause however subsisting, the disease frequently terminates either in a gangrene of the kidney, or an abscess. If the kidney become gangrened, death must be the unavoidable consequence, as it will be impossible to apply proper remedies to the part affected. If an abscess forms, the event of the disease will depend upon the part of the kidney in which the stone is lodged. If the stone is in the *pelvis*, or in the *papillæ*, the abscess forms internally towards the cavity of the *abdomen*, and may penetrate into it, if the patient does not perish first by the violence of the symptoms. But if the stone lodges in the tubulous substance near the cortical part, the abscess extends to the *membrana adiposa*, and may possibly appear outwardly under the false ribs, within the breadth of three or four fingers of the spine. As soon as ever the fluctuation of the *pus* can be felt, it must be let out, and the stone seldom fails coming away with a large quantity of matter. There is a case of this kind in my *Observations*, p. 229, which I shall beg leave to refer the readers to, as it will be more instructive upon this subject than any thing I can add here.

Of Stones in the ureters.

THE *ureter* is a canal, or pipe, which, extending from the *pelvis* of the kidney, runs along the cellular substance of the *peritonæum*, and opens into the bladder an inch at least from its orifice, between that and the *rectum*. This canal is very narrow, and though of a very strong texture is capable of being distended, but contracts again by its elasticity. Through this the urine, which separates in the kidneys from the blood, runs into the bladder, and by the same way also, the small stones which the urine carries along, either do, or ought to pass. When these stones are round and smooth, they make their way without pain, so that frequently those who void them with their urine, are never sensible of their passage through the *ureters*; but if they are at all large, or angular, they cannot pass without difficulty, and their lodgment brings on nephritic pains.

THE different degrees of this disorder depend upon the figure of the stone and the nature of the canal, which being designed only for a fluid, distends with some difficulty, when either the bulk of a stone is too large for its diameter, or so rough and uneven as to excoriate as it passes. Fortunately in such cases, the urine, which flows through, gradually carries this small stone downwards; and hence we may learn the reason why the urine is sometimes tinged with blood either before or after the stone has got through. When this happens, the patient is sensible of its passage, and his pains continue till it has passed into the bladder. Upon opening the bodies of those who have been subject
to

202 OF THE STONE.

to void stones, I have always found the kidney full of them, and the *ureter* of the same side much larger than in a natural state. It has been sometimes so much distended as to admit the introduction of a finger. Undoubtedly, in these cases, the *ureter* had been dilated gradually, either by the stones which had passed through, or by the urine itself, which, when it drives a stone before it that passes with difficulty, must necessarily in some degree force, and thereby enlarge the diameter of that part of the *ureter* which is situated above the stone.

BUT the bulk of the stone may be considerably larger, and its asperities very great; in which case it passes with still greater difficulty; for the *ureter*, being very much irritated at the part where it compresses the stone, contracts itself more strongly, and the stone is intirely stopt there. From this irritation proceeds an inflammation of the *ureter*, which inflammation extending to the *peritonæum*, to which it is connected by its cellular membrane, a fever ensues, and the pain increases with violent shootings. The urine cannot force the stone along, because of the convulsive tension of the parts that suffer; and, unless effectual remedies are speedily administered, the patient dies.

If the *ureter* is stopt by the lodgment of a stone, so as quite to obstruct the passage of the urine, it is reasonable to conclude that forcing diuretics must rather be prejudicial than useful. The intention then to be answered is to abate the inflammation by frequent and copious bleedings, in proportion to the patient's strength; by things that relax, as repeated *semicupia*, emollient cataplasms, applied over all the region of the loins from the
 I spine

spine forwards; likewise by oily draughts, and in a word, by whatever may contribute to abate the convulsive tension of the *ureter*, and lessen, if possible, that too great elasticity which makes it press so strongly upon the stone. If we are fortunate enough to effect this, the urine, which continually filtrates through the kidneys, may carry the stone with it: in this case the patient feels it pass on a sudden; and as the stone is fallen into the bladder, and the compression removed, the pain of course ceases.

BUT it may happen likewise, that though the inflammation be removed, yet the *ureter*, being obliged to yield to the bulk of the stone, thereby loses its elasticity, and remaining larger in this part than in any other, the stone continues there; and if there should be a fresh accession of gravel, that stops too, and the *ureter* is still more dilated. Upon dissecting a woman who had been executed, I found the middle of the *ureter* distended so as to admit a collection of three ounces of gravel, through which the urine passed and filtrated as through a bed of sand. This woman must certainly have suffered greatly when the gravel first began to stop. The other part of the *ureter* was in its natural state.

I have found likewise in the *ureters*, either on one side or the other, but never in both at a time, some stony substances adapted to the figure of the *ureter* itself, and which entirely filled it. These substances had been formed probably by the collection of an infinite number of grains of sand, which had been brought away from the kidney with the urine, and cemented together. I never observed any of these concretions but in such people whose bladders were become callous

callous by having long suffered from the lodgment of a stone in them; and undoubtedly this hardness or callosity had also contracted the entrance of the *ureter* into the bladder; and the *ureter*, we know, is in its natural state very narrow as it passes between the membranes of the bladder before it opens into the cavity. And hence it was that the gravel, being unable to make its way into the bladder, was accumulated in the *ureter*. These persons have never complained of any other nephritic symptoms except slight twinges in the kidneys.

Of the Stone in the bladder.

STONES may be formed in the bladder by a collection of small gravelly substances, which unite and adhere together, in like manner as has been described in speaking of the *prepuce* and the *ureter*, and as will also appear in the *Observation* hereafter related; but those which are generally found in the bladder, or which pass from thence, proceed from one of the kidneys, and are brought down by the urine.

UPON their first entrance into the bladder they are but small, and when patients who are subject to the gravel perceive that a stone has got through the *ureter*, they should be instructed in what manner they ought to discharge their urine, in order to facilitate the passage of the stone out of the bladder.

THE urine is secreted in a much greater quantity, and sooner, by drinking some diuretic liquor; and the stream carries with it the small stones that are in the kidneys. The case is the same with the small stones that are fallen into the blad-

bladder, since nothing but a flow of urine can carry them along, and forward their passage out. A patient therefore who has reason to believe that a small stone has passed down, ought, after having drank some diuretic liquor, to let his bladder be sufficiently filled to give him a strong inclination to make water. This done, he should place himself upon his knees, with his body inclining a little forwards, for in this posture the small stone will by its own weight naturally approach the neck of the bladder, as a cork within a bottle falls down into the neck of the bottle when turned upside down. The urine, by this means, flowing out very plentifully, must necessarily carry along the stone much easier than if these precautions had been omitted; and I am fully persuaded, that if those persons who are troubled with the gravel would always observe these rules, we should not find so many of them subject to the stone.

If the stone continues in the bladder, it daily increases, by the accession of fresh *strata* which are formed there. While it is small, it floats in the urine, and often changes its situation according to the different attitudes of the body; but when it has acquired a certain degree of weight, it no longer floats in the urine, but, by the frequent contractions of the bladder, and being forced on by the urine, it generally approaches the neck; unless the stone adheres to the bladder, or is lodged in one of those cavities which are sometimes found in bladders that have formed cells.

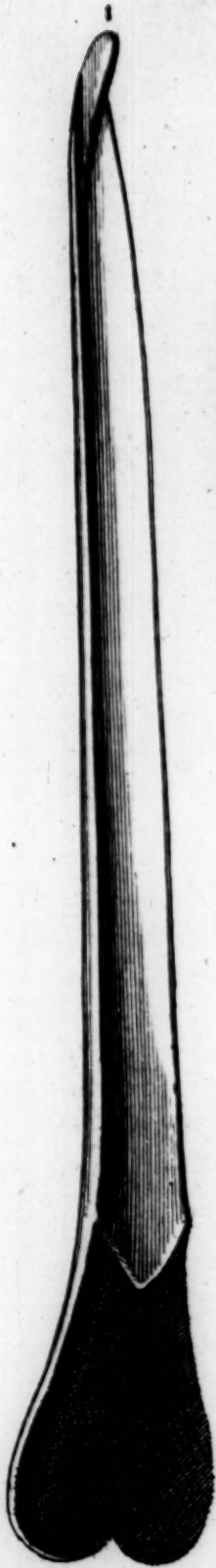
BEFORE I enter upon the diagnostic signs of a stone in the bladder, it may be proper to say a few words of stones which adhere, and of the differences

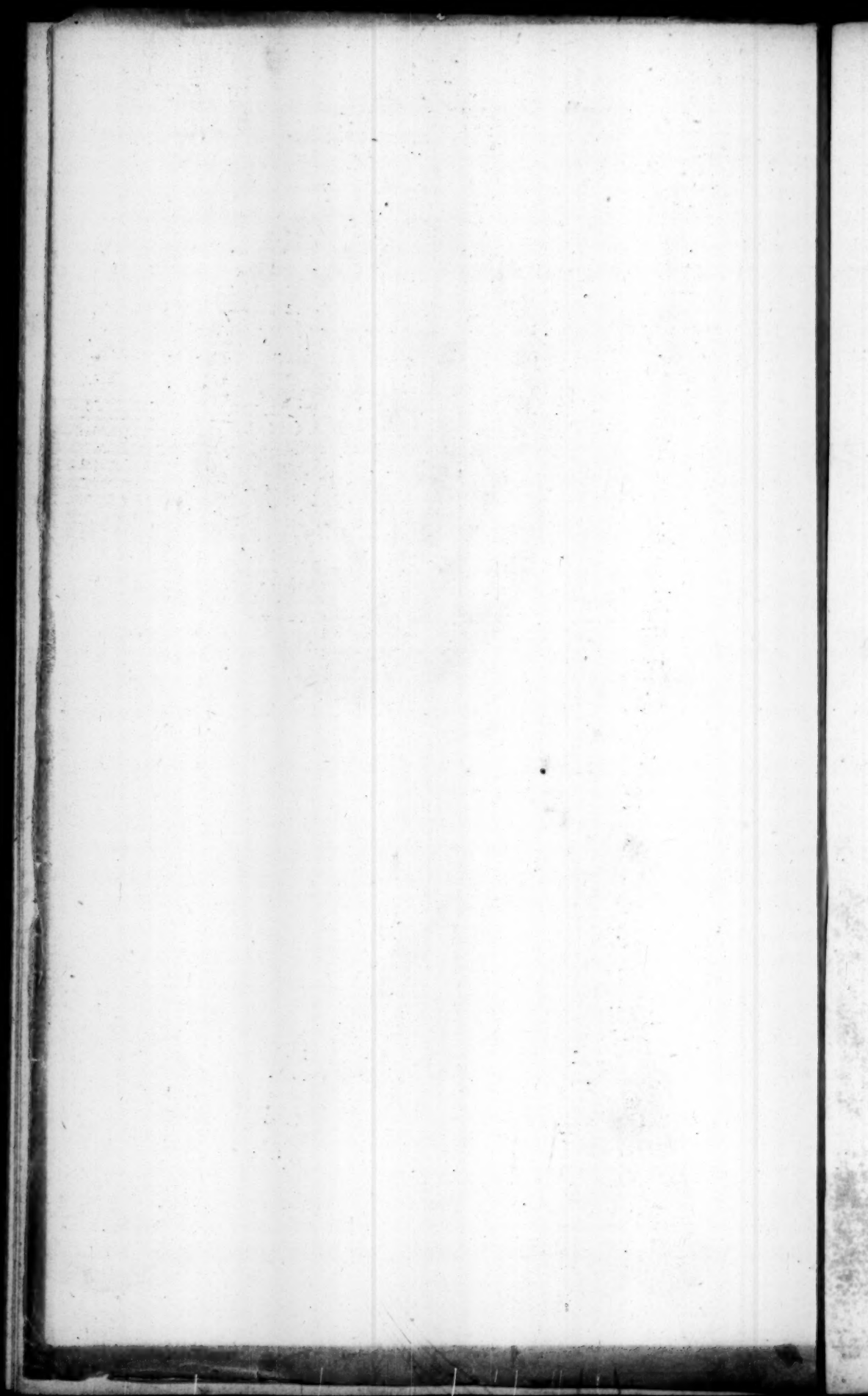
ferences that are sometimes observable in different bladders, as these two particulars are very necessary to be known.

Of Stones that adhere.

I AM thoroughly sensible of the impossibility that an animated body which subsists by a circulation of fluids, and another body which owes its bulk intirely to an apposition of matter, should become one and the same by any kind of adherence, let it be ever so strong; and therefore I must condemn those operators, who, when they have not been able to extract a stone, have made use of this pretended adhesion as a defence against censure; alledging that it was better to leave the stone behind, than to pull out the bladder with it. That there are stones which adhere, I make no doubt, because I have seen instances of them; but these adhesions are not of that nature to prevent the extraction of a stone, provided it can be laid hold of with the forceps. In 1730, I cut a lady, and extracted a stone that weighed seven ounces and a half. One side of it was uneven, likewise three inches long, and two and a half broad, and was in a manner intirely incruited upon that part of the bladder that is connected to the *intestinum rectum*. This incrustation was occasioned by the inequalities of the stone, which had produced an excoriation of that part of the bladder upon which they pressed; and in consequence thereof a number of fleshy or fungous excrescences arose from this ulcer, and had lodged themselves in these cavities of the stone; the shape of which may be seen in the copper plate annexed, *fig. 3*. The adhesion was separated with
hardly

To face Page. 206.





hardly any pain; and it is probable I should not have taken notice of it, but by the inspection of the stone, which had brought away many of these excrescences with it. I have now the stone in my possession, and the marks of its adherence may still be seen; and what fully convinced me there had been an adhesion, was, that ten days after the operation, the diseased part of the bladder sloughed away, casting off three pieces of membrane, which were each about a quarter of an inch thick, about an inch in diameter, and passed with the urine.

I HAVE since this extracted from three patients, stones which adhered in the same manner, but the surface of their adhesion was not so large in proportion to their size: these patients were all cured, so that I had an opportunity of examining the bladder only of one of them, who died some months after of an hæmorrhage from the nose, and nothing was to be seen in it but a *cicatrix*.

It is certain also, there are sometimes stones so fixed in the bladder that they cannot change their situation. In 1715, I was present at an operation performed by the late Monsi. *Marechal*, when he extracted a stone from the bladder which was shaped like a calabash or gourd, and brought with it a *fungus* which encircled the stone at its narrowest part. As this fungous excrescence passed round and covered the middle of the stone, no new *strata* could be formed in that part, but were made at the two extremities, which was the reason of its being so shaped; and the *fungus* fixed it so in the bladder that it could not possibly change its situation. Hence then it appears, there may be stones which adhere to the bladder, and others so fixed in the bladder that they cannot
present

present themselves at its orifice. These adhesions; indeed, are never very strong; but, though they cannot prevent the extraction of the stone, they are sufficient, as long as they subsist, to hinder its presenting itself at the orifice of the bladder.

Of the different shape of the bladder.

THE bladder, even in a healthy state, is not always alike in all subjects, any more than the other parts of the body. Some, for instance, resemble a pear, being large at their *fundus*, and small towards their neck; others are almost as large at the neck as at their *fundus*. These differences may be answerable to the shape of the *pelvis*, which is sometimes very large, sometimes very narrow.

THERE are some bladders which are naturally very narrow where the *ureters* open into the cavity, and very large above that part. These, when they have suffered by the lodgment of a stone, become sometimes so contracted in this part that the bladder seems to be thereby divided into two, and to resemble a calabash or gourd, that is, to form a small bladder where the orifice is situated, and another very large adjoining to it. As it is the posterior part of the bladder, nearest the *rectum*, which suffers most by the lodgment of a stone, so it is this part separating the entrance of the two *ureters* that forms this contraction. In which case it grows thick like membranes that are inflamed, and forms a kind of *septum*, so that when a patient lies upon his back, a stone of a moderate size may be concealed behind it, and the *catheter*, though introduced at the neck of the

the bladder, and passed beyond the stone, may not happen to touch it.

IN some bladders several cavities or cells have been found, large enough to contain a nut in each. These cells were situated indifferently in respect to the neck of the bladder, or its *fundus*, but always in the sides towards its posterior part. I have seen other bladders where the entrance of the *ureter* was so greatly distended, that it seemed as if the stone had lodged there a considerable time. In 1732, I cut a patient who had a stone fixed in the *ureter* like a diamond in its socket, but did not enter the bladder above one third of an inch; which prevented me on the day of the operation from taking hold of it with the *forceps*: but, finding about seven weeks afterwards it had made its way into the bladder about half an inch, I got hold of it, and brought it out. It was two inches in length, and without doubt would have continued as fixed in its socket as before, had there not been a suppuration in that part. Its form may be seen in the print, *fig. 4*.

FROM considering these different shapes of the bladder, it is natural to suppose that the stone may sometimes not present itself at the orifice; of which take the following proofs.

PATIENTS have been searched, and being convinced they had the stone, have taken medicines for a considerable time to dissolve it; in short, their pains have ceased, they have lived several years after, and imagined themselves cured; but dying of some other disorder, they have been opened, and several stones were found in the *fundus* of the bladder, which was contracted in its middle as was before described. It may be asked, why they were so long without feeling any

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pain

pain upon making water? The answer to this, is, the stone, having changed its situation, had lodged itself in this posterior part of the bladder, and no longer pressed upon the orifice. In 1734, I searched a patient, and feeling a stone, he resolved to be cut; but from the very day he was examined, his pains ceased, and I thought it proper to defer the operation, both on account of his age, which was seventy-four, and of his being lately recovered from a dangerous fit of sickness. This respite lasted about three weeks, during which he did not feel the least uneasiness; but at the expiration of that time, he came to me again, the pains returning upon him with great violence, and I cut him three days afterwards, when I extracted a stone that weighed four ounces. In all probability, by searching him, the stone had been pushed back, and consequently as it no longer pressed upon the neck of the bladder, it gave no uneasiness, but being brought there again by the urine, the pains returned.

WE daily meet with persons afflicted with the stone, who tell us, that their urine comes away in the night without hurting them; but in the day, they either make it with much pain, or cannot void it at all. Upon enquiry, we find, that in the night they make water as they lie upon their side; which situation of the body does not incline the stone to present itself at the orifice of the bladder, whereas an erect posture occasions it to fall down there.

IN 1740, I attended a patient whom I had examined, and felt a stone with the *catbeter*, which instrument he had kept in, and confined himself to his bed for six months, having by the help of that been freed from pain in voiding his urine; but

but when he got up to have his bed made, if he took out the stilet, the pains would return when the urine was almost discharged.

I must here remind the reader of the case where the stone adhered, which was mentioned in page 206. It weighed seven ounces and a half, and probably had been growing between twelve and fifteen years, and yet when I searched the patient it had not begun to pain her above three weeks. This was owing to the stone's adhering to the bladder, so that it did not touch the orifice; and the pains did not begin till the stone, being enlarged by the addition of new gravelly *strata*, pressed upon the orifice of the bladder. From the foregoing considerations, it is reasonable to infer, that the pressure of the stone upon the orifice of the bladder is the chief cause of the pain.

SIGNS. We find, by experience, that a stone in the bladder generally occasions an irritation and an excoriation there, with a callous induration, a retention of urine, or a continual motion to make water. These symptoms, of which we are going to give a more particular account, may serve as diagnostics. They may enable us likewise to judge pretty nearly of the bulk of the stone, and its surface: but we have no sign to distinguish whether a stone adheres or not; or whether it is fixed in any part of the bladder, or is lodged in any particular cavity.

Of the signs beforementioned some are doubtful, others are so certain as leave no room to question the existence either of one or more stones.

If a patient feels a pain in making water, and the urine sometimes stops on a sudden, but has a free passage immediately afterwards, this is proba-

bly owing to a small stone being brought by the urine to the neck of the bladder, and presenting itself at its orifice, hinders the urine from passing. This symptom ceases as soon as the stone is removed, and intirely disappears when the stone is grown too large to enter the orifice of the bladder.

A FREQUENT itching in the *penis*, even when the patient does not want to make water, is another doubtful sign. Children, that have the stone, are always pulling that part. This itching, which is occasioned by an irritation produced by the stone in the bladder, communicates itself to the *urethra*, and may be compared to that which children feel at the nose when they are troubled with worms. We may judge by this symptom that the surface of the stone is uneven.

ANOTHER uncertain sign is the having glairs or films in the urine, whether they appear after the urine is grown cold, or before; but if this symptom is not attended with any other, it may indicate only some indisposition of the bladder.

A FREQUENT or continual motion to make water, the usual consequences of the irritation caused by a stone, is likewise an equivocal sign, since this may equally attend a disease of the bladder.

IN this class too we may reckon the *pus* which is sometimes found in the urine; as it may be produced either by the stone, by some disorder in the bladder, or a disease in the kidneys.

THERE is one symptom less doubtful than any of the former, which sometimes happens to those who have the stone, and that is, they cannot ride on horseback, or in any carriage, without making
bloody

bloody water. This indeed does not happen, but where the stone is either angular, very uneven, or else adheres to the bladder. If it adheres, the jolting may separate it intirely, as the adhesion is but slight; or it may break only some part of the adhesion, which will produce an hæmorrhage in like manner as happens to pregnant women, whom a fall or violent jolt will occasion to void blood by separating part of the *placenta*. If the stone is angular, its points may wound the bladder.

THERE is one sign which I look upon as certain; and that is, the violent pain the patient feels in making water when he tries to void the last drops. This pain proves there is a stone, and that it lies and presses upon the neck of the bladder, when the bladder contracts itself to expel the last drops of urine.

BUT though this last symptom certainly proves the existence of a stone in the bladder, yet the being free from it is not a decisive argument of the contrary; for many patients have been known to have the stone (as was before observed in speaking of stones that adhered, and of the different shapes of the bladder) who nevertheless discharged their water without pain; but as appearances are often deceitful, we may add, that this is not the only instance wherein we are greatly embarrassed to determine with certainty, whether a patient has the stone or not.

THE bladder is subject to many different disorders, some of which are attended with a pain in making water; and it is chiefly in this last symptom that a surgeon may be deceived, from the uncertainty of the other concomitant symptoms: for frequently there is reason to think the pain

is caused by a stone, though there is none; and sometimes it seems occasioned only by a disease of the bladder, and yet there are stones. Such, for instance, are the almost constant pains a patient feels there, besides those which are felt particularly upon making water; and the ceasing of these pains for many days together, even when he does make water. Such also is the *pus*, which flows in great quantities, either mixed with the urine or after discharging it; likewise the patient's not being able to empty his bladder every time he makes water, with the frequent retentions of urine and the colour of the *catheter*, the end of which comes out black whenever the patient is searched.

In this case, regarding only the disorder of the bladder, an opening has been made in *perinaeo* like that which we use when we cut for the stone, with an intent only to introduce a *canula* into the bladder, in order to throw in proper injections; but how frequently upon these occasions have stones been brought away, which were never suspected to have been lodged there?

I COULD produce many instances that have happened within my own knowledge of stones coming away in this manner: amongst others, I shall present the reader with the following; for as the symptoms of this disease may vary in many circumstances, it is by observations only we can distinguish its signs, and learn the proper methods of treating it. The case which I am going to relate may probably be very conducive to that end.

In the beginning of 1739, a gentleman felt at different times, some slight pains in making water, which became daily more frequent, so that in 1740, he was almost constantly voiding it, but dis-

discharged only four or five spoonfuls at once. He neglected this disorder for some time, but in *October*, being seized with a retention of urine and in great pain, he had recourse to his surgeon *Mons. Bimont*, who searched him, and drew off near three quarts of water. The bladder could not be so distended as to hold this quantity without losing its elasticity; accordingly the patient was till *June*, 1741, without making water but by the help of the *catheter*, which was now and then taken out in order to clean it. Frequently, after the urine was discharged, some matter would issue out, of a very offensive smell. I was then consulted, and we judged that the bladder was in some measure paralytic; for otherwise it is not usually so long before it recovers its tone after a violent extension. It was agreed to throw in some vulnerary and detergent injection through the *catheter*, night and morning, which was continued near three months; and at the end of that time he made water for about a fortnight without the *catheter*, but was afterwards obliged to have it passed again, and, till the month of *November*, had frequent intervals of between seven and eight days, in which he could discharge his urine without this instrument. It is proper to observe here, first, that though he sometimes voided five or six ounces at once, yet his bladder was not emptied; for, in order to be satisfied about this, we passed the *catheter* again after he had made water, and brought away near four ounces more, mixed with *pus*. Secondly, that this patient was only sometimes in great pain when he made water, and that this pain abated, and even ceased before he had done. Thirdly, that the *catheter* having been introduced in the space of

eighteen months above thirty times by Mons. *Bismont*, and three or four times by me, we had never felt any stone in the bladder, though we had searched him both in an erect and supine posture. Fourthly, that the patient was extremely lean, and had a hectic fever, occasioned, no doubt, by his frequent pains, want of rest, and the disorder of his bladder which constantly suppurated. All these circumstances considered, there was no room to question the bladder's being in a state of suppuration, and it was to this disorder alone we judged all the concomitant symptoms ought to be imputed; and consequently, as that particularly engaged our attention, our curative intentions were directed accordingly. The ill state of the patient, who visibly wasted away, induced us to propose to him an operation by which we might easily discharge the *pus* that continually lodged in the bladder, and inject proper medicines to cure it. He consented to this, and as he had long been under a very strict regimen, there was no occasion for any further preparation.

THE patient being put into the same position as in cutting for the stone, I introduced the staff, and cut upon it in the same manner as will be described in the operation of *lithotomy*. After this, conveying the gorget into the bladder, I drew out the staff, and thrust my finger beyond the neck to dilate the opening; and then introducing a *canula* into the wound, left it there. This *canula* was as large as one's little finger, and of such a length, that one end might reach into the bladder beyond its neck, whilst the other remained out of the wound. The patient was afterwards returned to his bed, and the *canula* secured in its place by the bandage used in *lithotomy*.

THE *canula* continued in till the fifth day, during which time abundance of very foetid pus flowed out with the urine.

WHEN the wound began to suppurate, the *canula* was removed without difficulty, and we substituted a tent in its stead, which contained a small leaden *canula* in the middle of it. This tent was of the same size with the first *canula*, and kept the sides of the wound open; but by its bulk it would have prevented a discharge of the urine, had it not been for the little leaden pipe inclosed, which afforded a passage. The tent was armed with a digestive to promote a suppuration throughout the whole extent of the wound, and likewise in the neck of the bladder, which had suffered during the progress of the disease.

As soon as the wound had suppurated, I began night and morning, by means of a female *catheter*, which was introduced after removing the tent, to pass some injection into the bladder. During the first days there flowed out, besides urine, above a pint of very foetid matter; and the *catheter*, when withdrawn, looked as black as ink. At this time, not above two or three ounces of injection were thrown in at once; and as so small a quantity excited a motion in the patient to make water, it induced us to believe that the bladder could not contain more; but from day to day, in proportion as it suppurated, it grew more relaxed, and would admit a larger quantity of the injection.

TWELVE days after the operation, feeling a stone in the bladder; with the *catheter*, I introduced a small pair of *forceps*, and extracted one about the bigness of a pea. Three days afterwards I felt another stone, which was extracted in the same manner, and was as large as a chestnut.

Each

Each of these were almost round, very smooth, and a little flatted on the sides. There was but very little *pus* came away after the extraction of these stones, and the wound seemed to heal every day, for the urine passed freely through the *canula*, and without pain, except some few slight twinges that the patient felt when the bladder contracted itself; and this induced me to leave in the *canula*, which gave him no uneasiness.

In the mean time the hectic fever, with the looseness, still continued, attended with a loathing of all nourishment; and the patient, who was likewise subject to frequent vomitings, visibly wasted away, notwithstanding the most proper medicines were prescribed by *Mons. Gouttard* his physician. In this melancholy condition he remained three months, and then died in a perfect *marasmus*.

I OPENED him, and found all the parts of the *abdomen* in a sort of decay and wasting, and in several places a suppuration. The bladder was very small, having lost the habit of being dilated by the urine, which passed freely through the *canula*. It was not thickened like those that are grown callous, but quite in a decay, like the other parts. Six or seven small stones were contained in its cavity, of the size of millet seeds; and upon closely examining the internal surface, a number of small gravelly particles, of the same size, came out from thence, as if each had been lodged in a particular cell. There were more than fifty of these all of the same size.

THIS observation affords us a convincing proof, that stones may be formed in the bladder, and consequently that those which are found there do not come always from the kidneys. It likewise teaches

us that there may be one or more stones in the bladder, and yet they may not present themselves at the neck of it when the urine issues out.

To conclude, notwithstanding an experienced surgeon may by all these signs be convinced that there is a stone in the bladder, yet a patient will not be convinced of it himself till he has been searched, and the stone felt with the *catheter*. Upon this consideration therefore the surgeon should examine him, and it would not be amiss to let the patient feel the stone.

Of the introduction of the catheter, or the manner of searching.

A SURGEON, to perform this operation properly, should be well acquainted with the shape and winding passage of the *urethra*, through which the *catheter* must pass into the bladder; and he should take care that the patient be placed in a proper position.

I NEED not describe the form of the *catheter*, since that is well known. The curvature of it ought to be proportionable to the make of the patient, which may be guessed at sight; and the size of it suitable to the diameter of the *urethra*, which may be judged by the orifice of the *glans*. A pretty large *catheter* always passes better than a small one, as by dilating the passage it makes a small opening before it, and thereby follows its course more easily; whereas if a small one is made use of, the sides of the *urethra* do not open thus before it as the instrument advances. Besides, to persons who are difficult to be searched, a small *catheter* may happen to penetrate the internal coat of the *urethra*, and open for itself a false passage,
which

which cannot easily happen by the use of a large one.

WHEN we search a person for a suppression of urine, it should be done in his bed, and lying on his back, with the breast somewhat raised, and the knees a little bent and spread. If we search him to find whether he has the stone, it must be done, if possible, whilst he is standing, that the stone, which in this posture generally falls down upon the neck of the bladder, being brought thither with the urine, may strike against the end of the *catheter*. For want of this precaution the stone has frequently been missed; but, if we cannot avoid searching him in bed, he must be turned, if possible, and made to sit upon the bed-side, when the instrument is introduced.

AGAIN, when we search a patient for the stone, it must be done when he has an inclination to make water, for if he has lately discharged his urine, it is probable you will not feel the stone. If, however, it is necessary to search the patient immediately, we may make an injection into the bladder through the *catheter*, to supply the want of urine; then letting it out again, we shall feel the stone with the last drops.

MEN may be searched by turning the handle of the *catheter* towards the belly, in which case we need only follow the course of the *urethra* with the end of the *catheter*: or we may introduce it by turning the handle at first towards the knees till the instrument is advanced to the entrance of the curvature of the *urethra*, and then turn the handle towards the belly.

HAVING oiled the *catheter* to make it slip, I support the *penis* with three fingers at the *corona glandis*, taking care not to compress the *urethra*,
which

which is situated under the *corpora cavernosa*; and I gently introduce it through the *urethra* into the bladder. The great art in searching is to have a kind of intelligence between the hand that supports the *penis*, and the other which directs the instrument, for they ought to act so in concert that alternately the *catheter* may be thrust into the *penis*, and the *penis* drawn forward upon the *catheter*. This caution is particularly necessary when the end of the instrument reaches where the *penis* is joined to the *os pubis* by the *ligamentum suspensorium*, and when it comes to the curvature of the *urethra* to pass under the *os pubis*. This I think is certain, that in passing the instrument we ought rather to draw the *penis* upon the *catheter*, than to push the *catheter* into the *penis*.

WOMEN are to be searched only in a supine posture; but it is much more easily done in them than in men, as their *urethra* is almost straight. The method of doing it is to open the *labia*, and introducing the end of the female *catheter* into the orifice of the *urethra*, you turn the curved part of it towards the *os pubis*, and pass it gently forwards till it gets into the bladder.

IN either sex, we know when the *catheter* reaches into the cavity of the bladder, by the urine running out at the orifice which is in the handle of this instrument. The patient must then be placed in the posture before directed, and upon taking out the stilet, the urine flows out. If the stone is large, it is easily felt; if small, it will not be perceived till the urine is upon the point of being all discharged.

WE must be thoroughly assured that what we feel is a stone, for I have often felt the bottom of the bladder resist the end of the *catheter*

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ter in such a manner as to induce me to believe there was either a *fungus* there, or some other indurated substance : and I have known people cut upon this symptom only, and no stone could be found. This therefore ought to make us very cautious in pronouncing that there is a stone.

In drawing out the *catheter* from men we bring the handle gently towards the patient's belly, and it easily slips out. In withdrawing it from women, we take care that it follows the same course as it had in its entrance.

PROGNOSTIC. When it is once certain that the patient has the stone, the next consideration regards the cure. There are many cases wherein this may probably be expected ; as on the contrary there are others which afford no hope of success.

If the patient feels continual pains in the bladder as well when he has as when he has not a motion to make water ; or if a pressure upon the *os pubis* occasions a pain in the bladder, it is probable that is the part diseased, and he will die in all likelihood notwithstanding our utmost care.

If he feels as much pain when he begins to make water as in discharging the last drops, there is reason to believe the bladder is diseased, and we generally find some matter comes away, which certainly proceeds from a suppuration in the bladder. If the pains are but slight, and only felt with the last drops, and yet we find in the urine a mixture of *pus*, this proceeds from one of the kidneys, or *ureters* ; and though the patient may be cured of the stone, he may die of the ulcer that produces the matter.

If the patient has a hectic fever, it indicates some latent suppuration, and nothing can save his life.

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If he has great pains in the loins, and yet voids no gravel, either the kidney or *ureter* is diseased, and he may die from the disorder of these, in which there probably is a stone formed.

HARD stones are for a considerable time less likely to create much disorder than the soft stones, as these latter encrease much quicker.

If a patient cannot retain the same quantity of water when lying as he does standing, probably the bladder is become callous. This however is not a reason why he may not be cured by an operation well performed, provided there is no particular bad circumstance that prevents it. I have extracted some very large stones by the operation, which the bladder so closely compressed that I could only take hold of one end of them, and yet the patients have done well. When the extraneous substance is removed, the bladder, unless it has suffered any particular hurt in the operation, will suppurate of itself; and by the help of injections it grows lax again, and recovers its former state, so that, the wound being healed, the urine may be contained there as usual.

PATIENTS who are very lean and emaciated, are subject, after the operation, to a *fistula* in *perineo*.

THE larger the stone is, and the more it pains the patient in being extracted, the greater room there is to apprehend an inflammation.

If a patient is constantly subject to nephritic pains, and voids small stones at the same time that he has a large one in the bladder, there is great reason to fear a relapse; for the source of the stony concretions still remains, and after the first stone is extracted, and the wound healed, a second may stop in the bladder, and increase there.

224 OF THE STONE!

WOMEN are less subject to the stone than men; which may be accounted for from the different structure of the parts. A small stone may pass from their bladder through the *urethra* more easily than in men; because the neck of the bladder is not inclosed and compressed by the *prostatæ* as in men; and for this reason we seldom find they have a stone of any considerable size:

CURE. A person who has a stone in the bladder, if he can be cured at all, it must be by one of the three following methods, *viz.*

By dissolving the stone with proper injections into the bladder through the *catheter*.

By effecting the same thing from the use of internal medicines.

OR extracting it by the operation of lithotomy.

IT were greatly to be wished, that any medicine could be discovered, which being injected into the bladder, would dissolve a stone there without affecting the bladder at the same time. Liquid caustics, such as spirit of nitre, *aqua fortis*, &c. will soon destroy a stone in a vessel, and would do the same in the bladder; but by ulcerating it, they would bring on a worse disease than the other. These medicines being diluted will likewise dissolve a stone by degrees, but in the same proportion as they acted upon the stone, they would also act upon the bladder:

THE want of a dissolvent which would have no ill effects upon the bladder, has induced people to seek for remedies which should give such a disposition to the blood; that the urine itself might become a dissolvent. There have been people in all ages, who have boasted of infallible remedies for this purpose; remedies of which, according to their account, they had made repeated trials, and

and which would reduce the stone into sand or slime, and thereby facilitate its passage with the urine. They have more easily persuaded patients into a belief of this, as it is natural to dread the pain and danger of an operation; but none of these remedies have hitherto, at least to my knowledge, proved successful. They have been known indeed to make the urine slimy, and this slime has formed a soft covering round the stone, which has secured the bladder from the asperities, that, by fretting it, occasioned pains there; and hence, many patients, being no longer tormented, or suffering but little in comparison with what they felt before, have imagined themselves cured; and they have been confirmed in this opinion by seeing their urine full of sand and slime, which they looked upon as a separation from the stone. But their security was not of long duration; for these lays of slime have successively hardened, and the stone has been thereby covered with a new *stratum*; and when they either left off the use of these medicines, or their urine ceased to be slimy, the last coat grew hard, and they were soon attacked with fresh pains.

NEVERTHELESS, though these medicines may not dissolve the stone, they may in some circumstances be useful. I have known patients so much wasted and weakened by pain and want of rest, that they were not able to undergo the operation; and yet by taking these medicines they have recovered their strength and flesh, and have afterwards had the operation performed. I would not therefore utterly condemn the use of them, especially as it is not impossible but that some of them may have been, in some instances, successful. Besides, many

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things may have conduced to deceive people, as to the experiments that have been made upon these occasions. First, he who sells the medicine finds his interest answered in publishing its efficacy, whilst the surgeon, who knows the operation is the surest and safest remedy, cannot submit to see a patient languish under the use of an uncertain one; which, as he knows not what it is, he cannot either approve or blame.

SECONDLY, a stone may change its situation in the bladder whilst the medicine is taking, and, no longer pressing against its orifice, be no longer felt; upon the strength of which, the patient proclaims himself cured, though in reality he still has the stone.

THIRDLY, a patient who is free from pain will not submit to be searched, and yet nothing but the introduction of a *catheter*, with the cautions before laid down, can make the certainty of his cure appear. Nay, it may even be necessary to repeat the use of the *catheter*, as there have been instances where this instrument has been passed three or four times before the stone could be felt.

FOURTHLY, a surgeon, who has searched a patient, and proposes the operation, in all probability sees no more of him, if he has recourse to these kinds of medicines, and therefore is equally ignorant of the good or ill effects of them.

FIFTHLY, we find many stones, which are certainly formed of different substances, since some are as hard as free-stone, others as soft as chalk, and some like the dross of iron; some are red, others white, or black; and it is unreasonable to believe that the same medicine can have a power of dissolving all. Supposing therefore one patient
cured,

cured, because the medicine happened to be proper to act upon the stone in his bladder, others on the contrary are not cured, by its proving improper in their cases; and this alone is sufficient to discredit the remedy. To conclude, many people of all ages, after having taken the most highly-applauded medicines of this kind for many months, and without success, have been obliged to be cut at last.

BUT whilst we are upon the subject of medicines which are supposed to dissolve a stone in the bladder, it may not be amiss to relate what I saw happen to a patient who took them.

IN 1732, an officer, who had a stone in his bladder, which gave him great uneasiness, thought to have avoided the pain of an operation by taking a ptisan and a powder, whose infallible virtues had been boasted of to him with great assurances by one *Beaulieu*; and he accordingly took them for above eight months. But when his health was by this means much impaired, and he complained to his quack, he ordered him nothing else for his relief but to dilute plentifully, and to bathe.

AT ten months end he came to me, and giving an account of what had been done, shewed a couple of lumps as large as tennis-balls, which he had formed of the gravel and sand that he had voided with his urine, and which, as they dried, had stuck together. Being persuaded that all this had come off from the stone, and that it must be quite dissolved, he was surprised that his pain in making water daily grew worse. Whereupon I assured him that he still had the stone; and that, instead of its being wasted away, it had been increased by the use of those medicines, which ren-

dering his urine slimy, had occasioned a more speedy accession of new *strata*. Accordingly I searched him, and found a large stone, which I made him feel. He resolved, upon this, to undergo the operation, and was cut eight days afterwards, when I extracted a very hard round stone, which weighed half a pound.

THE very day after, the urine, which ran out through the wound, smelt extremely offensive; and the parts upon which it came, as the *perineum*, the buttocks, and even the linen that was under him, were incrusted over with lays of stony concretions, that looked like mastich hardened upon them. It was to no purpose to remove them; for others immediately followed, and the same kind of incrustations covered the whole extent of the wound from the *perineum* to the bladder. They were of a brown colour, and so hard and solid, that they, in some measure, stopt the passage of the wound; and when I introduced a *catheter* into the bladder to throw up some injection, it was like passing it up a pipe of freestone. In this condition the patient remained for two and twenty days, without our being able either to remove the incrustations, or to bring the wound to suppuration.

DURING this time many symptoms intervened; as a continual fever with frequent paroxysms; sometimes a tension in the belly; at other times, a simple inflation only; sometimes obstinate constiveness, from the secretions not being duly made; at other times, *diarrhoeas* from irritation, with *nauseas* and vomitings. All these, however, were at last abated by bleeding, and other remedies, as the several symptoms required.

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IN short, on the twenty-second day, I separated some part of the incrustations, and in four or five days more removed all that were within reach; but the parts from whence I had taken them were black, hard, and looked as if caustics had been applied to them which had produced eschars.

ALL these kinds of eschars fell off by degrees, and occasioned so many wounds that required dressing; and, during ten or twelve days, a great many of the stony incrustations attached to pieces of membranes which had separated from the inside of the wound, also from the neck of the bladder, and perhaps from its internal cavity, discharged through the wound in *perineæ*. The wound at last became like other common wounds; but the patient was three months under my care before he was quite well.

No other method, therefore, can be depended upon but the operation of lithotomy; by which we may extract the stone, unless it be of a monstrous bigness, and likewise promise a cure, provided the patient is composed in his mind, and the operation well performed; or unless the case be attended with any of those bad circumstances beforementioned, which scarce leave any hopes of recovery.

IN order to perform the operation successfully, the patient must be prepared as will be directed hereafter.

Of the proper time for the operation.

THE public, who are always guided by prejudice in things that they do not understand, imagine we ought never to cut for the stone, but

in the two temperate seasons, spring and autumn ; and they are led into this opinion from the practice of the hospitals, where they chuse these two seasons, which authors have termed the times of election. But there is this difference between a ward in an hospital, and the chamber of a patient who can be provided with every thing necessary ; that in the latter we can make the season, and in the former we cannot.

THERE is also a time of necessity, and that is when the pains are violent ; for, whilst we wait for a temperate season, the stone grows larger, the bladder becomes diseased, and the patient sinks under his complaints. The only objection, as to time, is in the intense heats of summer, which may render the operation improper, on account of weakening the patient ; but as to any other time, I can truly affirm, that, by keeping the chamber warm, I have frequently cut patients in hard frosts, who have done perfectly well, nor has the season been any ways prejudicial to them.

Of preparations for the operation.

IF a patient that has the stone, and has determined upon being cut, is troubled with nephritic pains, we must wait till these are over before we proceed to the operation ; and even till the small stones that occasioned them are got into the bladder. It would be very unfortunate to have fresh stones fall down there after the large one had been extracted, which yet might happen, even before the wound was quite healed. In such a case, the patient would be to be pitied, and the surgeon would be accused of having left a stone in the bladder, which, in reality, came there after the operation.

To

OF THE STONE. 231

To prevent this misfortune, the patient should be blooded once or twice, and for some days ordered to take emollient and diuretic draughts, in order to bring away with the urine the little stones that lodge in the kidneys. At the same time he should frequently be put into baths of a moderate warmth, to relax the parts, that they may more easily suffer the small stones to pass, which the urine brings along with it. But whether this be the case or not, it will be equally proper to bleed and purge the patient once or twice, according to the fullness of his constitution, and as his strength will permit; enjoining him also an emollient, relaxing diet.

THE evening before the patient is to be cut, a clyster should be injected, to empty the *rectum*, which, if full of gross excrements, might occasion some inconvenience during the operation. The *perinæum*, *scrotum*, and the circumference of the *anus* should be shaved, and a proper place provided for the operation to be performed in. This done, there must be a firm table of a convenient height for the operator, and upon it a chair placed, the upper part of which should be turned downwards, so as to lie assaunt, and make a support for the patient's back; and it should also be put so, that the edge of the table may reach beyond the end of the chair, more or less, according to the size of the patient. The whole must be covered with a quilt that just reaches to the edge of the table, and over that a sheet: all these must be fastened together with cords, so as nothing can be displaced. The back of the chair might likewise be placed in the same manner at the foot of a bed. Every thing being thus prepared, we proceed to the operation.

Of the manner of cutting for the stone in men.

THE art of surgery, ever employed in finding out the safest and easiest means of cure, has been frequently engaged in endeavours to improve this operation; and the situation of the bladder, which may be opened either at its *fundus* or its neck, has suggested different methods of performing it; such as the *apparatus minor*, the *apparatus major*, the lateral operation of Mr. *Chefelden*, and that of *Monf. Rau*. There may likewise have been some others, which, as I do not propose to compare one manner of cutting with another, would be needless to mention.

THESE four methods, which I have described in the *Parallel* published by me in 1730, have still varied in the hands of those who have practised them; every one having either added to, or retrenched from them, according as his judgment directed him, in order to render them more perfect. I shall say no more here of these different operations, the advantages and inconveniences of which I have already demonstrated; but shall only describe the manner in which I have performed the operation for some years past, and which I have fixed upon preferably to any other, as it has always proved successful, even in the extraction of the largest stones. From this repeated success we may at least infer, that it is as little liable to inconveniences as any other method.

EVERY thing being ready for the operation, the patient must be put into a convenient situation for the surgeon, and be fastened there, that he cannot move. In order to this, he is to be placed upon the table, prepared as before directed, with

with his buttocks even with the edge of the table, his back leaning against the back of the chair, and his head supported by pillows.

Two assistants raise up his knees, and fasten his hands and feet with ligatures. The ligatures which I use are very convenient, as they are soon put on, and as readily taken off again without hurrying the patient, who, indeed, from the fear he is under, is not always sensible of their being applied; and they likewise secure the patient as effectually as the large ligatures used at the hospitals, which are described in the *Treatises of Lithotomy*. Each of the two ligatures is a tape, made of strong thread, two inches broad, and about two feet long, the two ends of which are joined together by a seam, in such a manner as to describe a circle. The tape being thus doubled, the ligature is but a foot long. A slip knot, made of such another tape, brings together and joins the two sides of this ligature, which then forms a sort of figure of eight. This knot is not fixed, but may be moved towards either end of the ligature. Each of the assistants passes one of the patient's hands into one end of the ligature, and fastens it with the slip knot at the bending of the wrists; which done, he passes the other end of the ligature under the foot like a stirrup. He then puts one of his hands between the patient's arm and his ham to bear it up, while with the other he holds his foot.

THE ligatures being thus applied, I introduce the staff into the bladder in the same manner as was before directed, and feel for the stone. The two assistants before-mentioned keep open the patient's knees, whilst a third stands on one side of him upon a chair. I then raise up the *scrotum*, and directing

directing the last assistant to support it with both hands so as to avoid bruising it by pressing it either against the staff or the *os pubis*, I place his two fore-fingers on each side of the part where the incision is to be made; one of the fingers being laid exactly along that branch of the *ischium* which rises towards the *pubis*, and the other pressed upon the *raphé*, that the skin may be kept fixed and tight. Whilst I thus place the fingers of the assistant who supports the *scrotum*, I still keep hold of the handle of the staff, and direct it so as to form a right angle with the patient's body, at the same time taking care that the end of it is in the bladder. This position is the more essential, as all the other instruments are to be conducted along the groove of this. If the handle of the staff was kept inclining towards the belly, the end of it would come out of the bladder; and the *gorget* missing its guide, would slip between that and the *rectum*.

THE staff being rightly placed, I take the knife from the assistant who holds the instruments, and put it into my mouth; then pressing the beak of the staff against the *rectum*, I feel the curvature of it through the *perinæum*. The incision ought to terminate an inch and a half below where we feel the bottom of the curvature. If we do not carry this incision sufficiently low, it may happen not to be of a size to allow the extraction of a large stone, and might lay us under a necessity of extending it further afterwards, for the skin will not lacerate here, nor easily give way for the passage of the stone. I therefore begin the incision from the lower part of the *os pubis*, continuing it down to the place that I before directed for its termination; after which, I pass the point
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of the knife into the groove of the staff, and cutting from below upwards, without taking the point out of the groove, I open the anterior part of the *urethra* as far as the incision that is in the skin.

THE beak of the staff, which was pressed upon the *rectum*, must now be raised and pressed against the *os pubis*. At the same time I turn the handle towards the right groin, that the groove which is at the beak of the staff may face the space between the *anus* and the *tuberculum ischii* on the left side; then carrying the point of the knife down the groove, I slide it along the beak, turning the edge that it may face the space between the *anus* and the *tuberculum*. By this incision I exactly divide the bulb of the *urethra*, and by doing this on its side, we are sure to avoid wounding the *intestinum rectum*, which for want of this precaution has been often cut. This first incision being made, I again pass the point of the knife into the curvature of the staff to the part where it bears against the *perineum*, and direct it to be held there by the assistant who supports the *scrotum*; this done, I take a large *director*, the end of which is made with a beak like that of the *gorget* (see *fig. 1.*); and conveying this beak upon the blade of the knife into the groove of the staff, I draw the knife out. I then slide the beak of this *director* along the groove of the staff into the bladder, and I withdraw the staff by turning the handle towards the patient's belly. The following circumstances will sufficiently satisfy us that the *director* is introduced into the bladder; first, if it strikes against the end of the staff which is closed; secondly, if the urine runs along the groove. I next feel for the stone with this *director*, and having found it, endea-

endeavour to distinguish its size and surface, in order to make choice of a proper pair of *forceps*; that is, one of a stronger or weaker make, or of a large or small size, agreeable to that of the stone; after which I turn the groove towards the space between the *anus* and the *tuberculum ischii*, and resting it there, convey a bistory along the groove, shaped as in *fig. 2.* the blade of which is half an inch broad, and about three quarters of an inch long. I continue the incision made by the knife in the *urethra*, and intirely divide the prostate gland laterally, as also the orifice of the bladder; and I am very certain that the introducing the use of these two instruments, which are not employed by other lithotomists, does not prolong the operation a quarter of a minute, but rather shortens the time, both by facilitating the dilatation that is afterwards to be made with the finger, and by rendering the extraction of the stone more easy. The bistory being withdrawn, the groove of the *director* serves to guide the *gorget* into the bladder; I then introduce my fore-finger along the *gorget* (which is now easily done, as the *urethra* and *prostatæ*, being divided, do not oppose its entrance), and with it I dilate the passage for the stone, in proportion to the size of which I discover it to be. This dilatation being made, I withdraw my finger, and use the proper *forceps*.

I HAVE taken no notice of this beaked *director* in my *Parallel of the different methods of cutting for the stone*, having invented this instrument since that treatise was printed; but I find great advantages in the use of it. First, it slips very easily to the end of the staff, which the *gorget* will not always do without difficulty, in those patients whose *prostatæ* are very large, so that we are
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more certain of conveying this into the bladder. Secondly, it is not so large as the *gorget*, and consequently has a freer motion in the neck of the bladder, by which we are better enabled to discover the situation, size, and surface of the stone. Another advantage is, that it serves to conduct the instrument safely wherewith we divide the *urethra* and the prostate gland, which cannot be performed by the common knife, because the size of it will not admit of its being carried far enough into the bladder.

NEITHER have I mentioned this incision in my *Parallel*, as I did not at that time practise it: but I have there observed, that whatever incision is made, in what is called the *apparatus major*, a part of the *urethra* and the *prostate* remain intire; that these must necessarily be lacerated by the introduction of the finger; and that the finger should be introduced very cautiously, as well to prevent injuring the wounded parts, as to avoid, as much as possible, giving pain. But as it is necessary that the whole passage should be opened, from the end of the first incision to the orifice of the bladder inclusively, it is much better done by incision than laceration; besides, a stone of a middle size cannot be brought away without lacerating the inner surface of the prostate gland on one side, if not on both, and occasioning a considerable contusion, as may be seen in the cases related in the *Parallel* before-mentioned. It is better therefore to divide it by a proper incision, as this will certainly be attended with less pain than lacerating it. Add to this, if on account of extracting a very large stone the parts must necessarily suffer a laceration, that which follows the incision I have proposed, only renders the opening of the wound

wound larger, and occasions much less contusion of the *prostatæ*. The incision, in this case, directs the laceration, which otherwise is always made with great contusion and irregularity.

ANOTHER advantage we derive from the incision, and which cannot be known but by performing the operation, and comparing it with other methods, is the ease with which the finger is introduced, and the passage dilated. Before I used this incision in the *urethra*, and the *prostatæ*, I often found great difficulty in repressing with the finger, the resistance of the neck of the bladder, which is invested by the *prostatæ*; and when they were large and hard, as they sometimes are, I did not, perhaps, get the better of it without injuring the tendons of the bladder, and the membranous part of the *urethra*, which alone sustained all the efforts of the finger in preventing the neck of the bladder's being forced towards its *fundus*; but by making the incision in the *urethra* and the prostate gland, the difficulty of introducing the finger into the bladder is removed.

By means of the *gorget* I pass a proper pair of *forceps* into the bladder from below upwards, following the arch made by the *os pubis*; and moving them along gently, to prevent pushing against the *fundus* of the bladder, which, by the urine being all run out, is brought near the neck, I introduce them till the rivet that joins the two branches reaches the orifice, and then I withdraw the *gorget*. If the bladder is pretty large, as it almost constantly is when the stone is not very big, and if at the same time the stone presents itself well, we easily get hold of it; but we must not attempt to make the extraction till we have lodged the stone in the middle of the claws. We may judge
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how it is taken hold of, that is, with which side of the *forceps*; but if our hold is not fixed upon the middle of the stone, we should place the *forceps* in such a manner that the two claws may rest together upon that part of the bladder which bears upon the *rectum*, and then opening them a little, we may expect that the stone, by its own weight, will fall down and lodge itself between the claws. Having secured it in this situation, we are not under a necessity of pressing hard upon it in the extraction, and consequently run less hazard of breaking it.

If a stone of a middling size slips from between the *forceps*, by the convulsive motion of the bladder, which being in pain, may occasion it to shift its situation at the very moment we thought ourselves secure of taking hold of it, we must open the *forceps*, and make several half turns alternately with the two claws, sliding along that part of the bladder which lies upon the *rectum*. This is the surest way of making the stone fall into the claws, and we frequently find, if we bring the claws near each other at every half turn, that the stone is got between them. If the stone is large, the bladder is generally callous; in which case it embraces the stone as one would with a hand, so that it cannot be laid hold of but at one of its extremities, the bladder itself preventing us from conveying the *forceps* far enough upon the stone to take a proper hold of it without running the risk of pinching up the bladder with it. When this case happens in children, we must withdraw the *forceps*, introduce the fore-finger into the bladder, disengage the stone, bring it with the finger near the neck, then pass in the *forceps* again and extract it.

If it is a grown person, we can introduce the finger no farther than the neck of the bladder, and therefore cannot by that means disengage the stone as in a child; but in this case we must gently open the *forceps*, in order to separate the sides of the bladder, so as to allow sufficient room for them to play. This done, we are to take hold of the stone in the best manner we can with the end of the *forceps*, and, without attempting to extract it, make two or three half turns on both sides to disengage it from the bladder which embraces it, and then draw it a little out of its socket: when it is thus disengaged, we must advance the claws of the *forceps* upon the stone by opening them a little, and get such hold of it that it may not escape.

As to those stones which are found in bladders, which, as we have before observed, seem to be divided into two by a contraction in that part where the *ureters* are inserted, they are sometimes exceeding difficult to be got hold of: a large stone may be lodged in the anterior part of the bladder, and be exactly inclosed there as in a *cystis*. In 1727, I performed the operation on a man of forty years of age in *La Charité*, who had a stone situated in this manner, which weighed eight ounces. The *forceps*, being introduced, got under the stone, the incision of the *urethra* being made near the *rectum*, and prevented me from taking hold of it; and very probably, in opening the *forceps*, which I did with difficulty, and after several attempts, the neck of the bladder and the intermediate part as far as the contraction were lacerated: fortunately indeed the patient was pretty lean. The loss of substance which this had occasioned, afforded room to introduce the fore-finger

ger from below upwards, between the stone and that part of the bladder which is connected to the *os pubis*, and, by the help of the finger, I passed in a pair of crooked *forceps*. This done, I opened them, laid hold of the stone, disengaged it from its socket by several motions, and extracted it. Notwithstanding the great loss of substance in that part of the bladder which is connected to the *rectum*, the patient recovered; yet I think, in such cases, it would be more adviseable to open it by an incision continued from that of the *urethra* and the neck of the bladder. If the stone should be in the *fundus* of the bladder, beyond the contraction, and it cannot be taken hold of even with a crooked pair of *forceps* (supposing the patient so young or lean as to allow us to feel with the finger the contraction that conceals it), I see no inconvenience can arise in dividing it sideways to a certain degree with a bistory, introduced upon the finger, and sharp only towards the point. This done, the stone may be laid hold of with the *forceps*, and be easily extracted.

As to those stones that are lodged in cells, it is impossible to take hold of them while they continue there.

HAVING thus given an account of the most proper means of laying hold of the stone in different circumstances, I acknowledge it is entirely from practice that I have learnt the methods I have here suggested, and indeed it is by that only a man can be enabled to speak of this matter with certainty. Those who apply themselves to this operation, may be some years before they can be taught these methods by their own experience, and perhaps at the expence of

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their patients. I have seen some operators who have immediately seized the stone as soon as they touched it with the *forceps*, and have endeavoured to extract it directly; but if it is embraced by the bladder, as some are, they may happen to pinch up that at the same time, which would produce an inflammation there. If the stone does not present itself immediately, they are a long while in searching for it, and by that means may probably injure the bladder very much. If they press hard upon it for fear it should escape out of the *forceps*, they break it. If they have hold of it at one corner only, it slips from the *forceps*, which are drawn away without it, and must be introduced again. The extraction of the stone, therefore, ought never to be attempted till we are sure the stone lies right between the claws of the *forceps*. I thought it incumbent upon me to lay a stress upon this, as I have been taught the great consequence of it by experience.

NOR is the proper manner of extracting the stone of less importance than the method of taking hold of it. When we have got a proper hold, we must turn the claws of the *forceps* in such a manner that one of them may face that part of the *urethra* which passes under the *os pubis*, and the other claw the part which passes over the *rectum*; for it is better to pass the polished surface of the *forceps* that way than to draw out the sides of the stone there, which perhaps may be very uneven and rough.

So likewise, in making the extraction, we must press against the *rectum*, in order to avoid injuring the arch of the *os pubis*, which cannot give way to the bulk of the stone; and that it may come out with less difficulty, we must withdraw the claws of the *forceps* by little and little, one after

after the other; that is, we must gently move one of the claws by drawing and inclining the branches of the *forceps* downwards, and then move the other claw by raising the branches upwards, and thus alternately till the stone be brought out. If we endeavour to extract the stone either by drawing it out in a straight line towards us, or by turning the claws and stone from one side to the other, as some lithotomists do, we should occasion such a loss of substance throughout the wound by the inequalities of the stone, as would very probably bring on an inflammation in four and twenty hours.

NOTWITHSTANDING all the care an operator can take to avoid breaking the stone, it is possible such an accident may happen from the softness of its texture. If he finds it break, he should open the *forceps*, which by pressing upon it might crumble it into very small pieces; for it is better to let it remain in such bits as are easily taken hold of and extracted directly, than reduce it into lesser parts which might afterwards slip away from the *forceps*. If we could be so lucky as to reduce it to sand, or a soft consistence, it would all come away very readily with the urine; but this is impossible, and some fragments would always remain behind. Besides, the patient is uneasy till he sees the stone, and quite unhappy if he finds it is not intirely extracted: And yet, though nothing but bringing away the stone will satisfy the patient, or render the operation perfect, it is sometimes better to leave it than to hurt the bladder by many fruitless attempts. In five or six days time, it may be easily brought away, as it will then present itself at the neck of

the bladder, being drawn thither by the urine, or by a kind of *mucus* which ouzes from the internal coats of the bladder.

WHAT I have proposed is as much with a view to secure the bladder from any injury as to lay hold of and extract the stone methodically, for the bladder itself deserves our utmost care and attention. The bladder, by being irritated to a certain degree, easily becomes inflamed, and this inflammation may end fatally. If therefore the operator's reputation depends upon extracting the stone, it depends yet more upon the recovery of the patient: for what would be thought of a lithotomist, who never failed to bring away the stone, but whose patients, soon after the operation, all died of an inflammation?

THE first thing to be done, as soon as the stone is extracted, is to examine its surface, and if there is part smoother than the rest, it is owing, as was before observed, to its being worn by rubbing against some other stone; if it is smooth on more than one side, it is an indication of there being more than two stones.

WE should immediately therefore introduce the button probe, search for the stone, and having found it, convey a proper pair of *forceps* along the ridge of that instrument, then lay hold of the stone, and extract it: the same method must be repeated either if there are several stones or several pieces of one large stone that is broke.

If the stone that is extracted is uneven in its whole surface, it is certainly single, and we need not search the bladder any more.

Of the use of the canula.

THERE are three circumstances which may happen in this operation, that will make it proper to leave a *canula* in the wound; one end of which *canula* should be introduced into the bladder a little beyond the internal orifice of the wound, whilst the other remains even with the skin of the *perineum*.

AND first, when the bladder is callous: in which case its internal coats will suppurate for some days; and when the wound begins to come into that state, it would be proper to make injections. The *canula*, therefore, will serve to keep the passage open; and when it is proper to inject, it may be done through the *canula*, or, which will be easier introduced, the female *catheter*. Secondly, the lodgment of a stone in the bladder that could not be extracted, or of some fragments of a broken stone. If we do not pass in a *canula*, the lips of the wound are apt to close too soon; and when the suppuration begins, which is the time that the stone may be extracted, it would be very difficult to introduce the instruments into the bladder, or at least they would be subject to give great pain to the patient; whereas if a *canula* has been used, you need only draw it out when the suppuration is come on, and as by its continuance in the wound it has preserved a passage for the instruments, the extraction will consequently be more easy. A case will in a short time be published in the *Memoirs of the Academy of Surgery*, of a stone which, being lodged in the *ureter*, advanced only one third of an inch into the bladder. The extraction could not be

made till seven weeks after the operation, and though nature is always inclined to close the wound and the neck of the bladder, yet I kept them sufficiently open all that time to introduce the *forceps* easily. The method I therein observed, will be mentioned in its proper place. To conclude, the third reason, to continue a *canula* in the wound, is the hæmorrhage that may ensue from the operation. The vessels whence the blood flows are not always so situated as to be discovered, and consequently neither a ligature can be made nor any styptic applied.

I HAVE often seen this hæmorrhage proceed only from a laceration caused by a large stone in its extraction, and I have never failed of stopping it with a middle-sized *canula*, covered with rag and sprinkled over with colophony. When this is rightly placed, it presses against the sides of the wound throughout its whole extent, and the sides of the wound press against that, so that the blood not being able to pass easily out of the wound, nor be received into the bladder, coagulates, and forms a clot round the *canula*; which clot, as soon as it has begun to form, extends itself to the mouths of all the opened vessels, and the blood itself choaks up its own passage. Again, as the orifice in the *canula* affords a free course for the urine that comes from the bladder, it can neither moisten nor force away the clot in passing, and the hæmorrhage, however violent, is found by this means gradually to abate, and at last intirely to cease.

IN 1733, I performed the operation upon a very large man of forty years old, and extracted a stone of a considerable size. There was no hæmorrhage appeared at the time of the operation,

ration, and as the stone was single and the bladder found, I did not chuse to introduce a *canula*; but on the ninth day, a hæmorrhage came on, and the lips of the wound being almost closed, I could not discern from what part it proceeded. This prevented me from putting a *canula* into the wound at that time, and therefore I only passed in a tent, which stopt the blood; but as the tent obstructed the course of the urine, it soon became necessary to remove it. And an hour or two after, the hæmorrhage broke out again, the urine having washed away the coagulated blood; upon this I introduced the female *catheter* into the bladder, and left it there, securing it with the bandage that it might not slip out. I likewise bound together the patient's knees, by which means I kept the lips of the wound near each other, so that the *catheter* was in some measure compressed and fixed there. The blood coagulated again, and the urine passing through the *catheter*, it was not afterwards washed away, but the hæmorrhage stopt intirely. The *catheter* was removed only once in every seven or eight days.

In order to introduce a *canula* at the time of the operation, we must pass a finger up the wound into the bladder, then convey a *gorget* along the finger, and by the help of that introduce the *canula*. If we were to attempt doing this without the *gorget*, the extremity of the *canula* might happen to make itself a wrong passage between the lacerated flesh, and not enter at all into the bladder. In which case it would occasion a great deal of pain to the patient, and not answer the end proposed in passing it, but on the contrary would become an extraneous body, and might be productive of bad consequences.

248 OF THE STONE.

THE operation being finished, the wound should be covered with a very thick compress, the ligatures taken off, and the patient put into a warm bed, with his knees brought close together.

To conclude, the regular application of the dressings, and the proper treatment of the patient afterwards, are circumstances as necessary to be observed as any that regard the performance of the operation.

Of the dressings.

It will be proper to leave the patient about half a quarter of an hour without dressing his wound at all, that the vessels may have time to discharge themselves. After this, the coagulated blood, which will collect round the orifice, must be wiped away, but that which is deeper in the wound should remain, since it is by these clots of blood that the hæmorrhage is to be stopt; and they will be liable to be loosened too soon by the discharge of the urine: it would also be proper to leave a dossil or two of lint between the lips of the external incision, in order to keep in this coagulated blood, and preserve the lips separate; applying upon these the pledgets and compresses. The *scrotum* must be covered and supported by a large square or triangular compress, which we call a truss, and the whole kept on by a bandage in the form of a double T. This bandage has two straps, which go off from the girdle or circular part at the loins, and being brought back towards the wound, cross each other upon it, and passing up on each side of the *scrotum*, are fastened at the forepart of the girdle.

THE

THE girdle or circular part is supported, and thereby prevented from falling down, either by a scapulary, collar, or shoulder straps; the last of which is much the most convenient, and less troublesome to the patient.

THE belly, particularly about the region of the bladder, should be embrocated with oil of roses, and covered with a flannel dipt in an emollient fomentation made very warm; and in order that this flannel may not wet either the patient or the bed, it should be wrung out so as only to retain its moisture and heat. The embrocation and fomentation must be repeated every two hours during the two or three first days; and as in these cases the urine passes through the wound and wets the dressings, fresh must be applied at least twice a day.

WHETHER you put a *canula* into the wound or not, the dressing should be of the most simple kind till the third or fourth day, placing between the lips of the external wound one or more threaded dossils, dipt in common digestive; upon these a pledget armed with the same digestive, the compresses and trufs steeped in brandy, and the whole kept on by the bandage beforementioned. If we should attempt to dress the bottom of the wound, by introducing a dossil there, we might probably bring on an hæmorrhage; besides, it will be hardly possible to do this, for the operation always occasions a swelling in the lips of the wound, and the parts that have suffered. But when the suppuration is procured, the swelling abates; and the bottom of the wound may then be dressed with different applications, according as the *canula* has or has not been introduced.

IF

If no use has been made of a *canula*, we must convey a doffil to the bottom of the wound, fastened to a long thread, to prevent its passing into the bladder, or else apply a tent of a sufficient length, and tied as the other. This precaution of securing the tent or doffil is very material. In 1732, I cut a child of eight years of age, who had undergone the operation three years before, and the stone which I extracted had formed itself upon a small doffil at its *nucleus*, which undoubtedly had slipped into the bladder from the former dressings. This doffil or tent serves only to convey proper medicines to digest the sloughs formed at the bottom of the wound, and in proportion as the swelling abates, and the suppuration encreases, we may pass them farther up. They should likewise be made very small, for as they will enlarge by the soaking of the urine, they might otherwise be liable to obstruct the passage of it.

When the sloughs are loosened, which generally happens about the tenth day, we must leave off digestive medicines, and dress the wound with detergents; soon after, trusting the bottom of the wound to nature, we are to do nothing more than dress superficially with dry lint. When we find the suppuration abate, which is owing to the sides of the wound gradually closing, we soon after perceive the urine return to its natural course. The patient himself is sometimes not sensible of this, otherwise than as he discovers it by his belly and the bandage being wetted. But sometimes he feels a sort of tingling pain in the *penis* when the urine opens its passage through the *urethra*. The wound may then be looked upon as a simple wound, and will soon heal with common applications.

IF a *canula* is introduced into the wound in order to stop the hæmorrhage, great care must be taken that it does not slip one way or the other, and that it does not come out; for its remaining there steady is absolutely necessary to keep up the coagulated blood which stopt the hæmorrhage, as well as to afford a passage for the urine. Towards the fourth or fifth day it generally grows loose, and, no longer adhering to any thing, may be easily removed; but great care should be taken not to pass any thing to the bottom of the wound, for fear of renewing the hæmorrhage: towards the seventh or eighth day the bottom may be dressed as was before directed.

IF we have had recourse to a *canula* on account of the bladder's having had a large stone lodged in it, and being thereby become callous, it will be proper for several days at each dressing to inject some emollient decoction; and this may be done by taking out the *canula* and passing the female *catheter* through the wound into the bladder.

WHEN the matter comes away unmixed with *mucus* and glaris, it is a sign the bladder is free from any thing of that kind, and therefore, continuing the dressings as was before directed, the use of the injections may be laid aside.

IF we have made use of the *canula* in order to facilitate the extraction of an entire stone, or the fragments of a broken one, which could not be brought away at the time of the operation, we must wait for the extraction till the wound comes thoroughly to suppuration, for if we should attempt it sooner, the swelling of the lips would obstruct our design. The *mucus* of the bladder and the urine together seldom fail to bring the
stone

stone or its pieces near the orifice; the *canula* may then be taken out, and by introducing the female *catheter* we generally find them near the neck of the bladder.

If they are little pieces, we may introduce a pair of small *forceps* or pincers, and take hold of them. If it is a pretty large stone, the patient must be placed on the side of his bed, with his knees raised and supported by two assistants, and then introducing a proper pair of *forceps* into the bladder, by means of the *gorget* or the ridge of the button probe, we lay hold of the stone and extract it. If the stone does not present itself near the orifice, injections should be made into the bladder by the female *catheter*, which will gradually bring it thither; and as soon as it can be felt with the *catheter*, it must be extracted.

As to gravel or very small pieces, they pass out with the urine, or are found in the wound or dressings. As long as there are any of these to come away, injections should be thrown into the bladder at each dressing, and care taken to keep open the bottom of the wound with a tent, the small end of which may enter quite into the bladder.

SOMETIMES an *ecchymosis* affects the whole *scrotum*, making it appear of a deep red colour, and in some places very black. This particularly happens when a *canula* has been put in, to stop the hæmorrhage; whence it should seem that the blood, not being able to make itself a way outwardly, had diffused itself throughout the whole adjacent cellular membrane. This *ecchymosis* disappears gradually by dipping the truss that supports the *scrotum* into brandy, and by the warmth preserved there by the fomentations.

Of

Of abscesses which sometimes follow the operation.

WHEN the operation has been difficult, and there has been a necessity of introducing the *forceps* several times, an inflammation has sometimes arisen, and has been followed with suppurations in the cellular substance about the *perinaeum* and round the bladder. These suppurations cannot be formed without exciting a fever, and many other symptoms. It depends therefore upon the surgeon's judgment to treat them differently, according to the parts where these sinuses are formed, either by opening them with a bistory or dilating them with a dofsil, in order that the matter may have a free passage through the wound.

WHEN the *scrotum* has been bruised, or too much compressed, by the assistant who held it up during the operation, there usually ensues an inflammatory swelling, and sometimes suppurations, the matter of which, being formed between the *scrotum* and the *os pubis*, runs along the *urethra* by the upper angle of the wound. But though the *pus* discharges in this manner pretty readily, yet it is sometimes necessary to make an incision, in order to give it still a freer vent: but in doing this, care must be taken not to cut the *urethra*. To discover the situation of this part the better, which the swelling of the *scrotum* may render difficult, it will be proper to introduce a small *bougie*, which will enable us to distinguish it by its resistance.

FREQUENTLY this inflammation of the *scrotum* degenerates into a *phlegmon*, producing one or more abscesses in the *scrotum*. If these cannot be prevented by resolvent cataplasms, they must be
opened

opened as soon as the *pus* is formed. When the wound is become simple, it soon heals by common applications, but it will be proper to confine the patient to his bed a week after the wound is quite healed, to let the *cicatrix* consolidate, which might otherwise be liable to open as he walked; and if he is allowed to rise even at the expiration of that time, his knees should be still secured together for several days, in order to prevent his separating them either by walking or some other accident; for the *cicatrix*, once broken, is very difficult to be formed again.

Of the manner of cutting women.

THE same preparations as were directed for the operation in men, will be necessary upon this occasion. The single difference that arises is in reference to the *menses*, which require us to perform the operation during the interval between them.

THE posture in which the woman is to be placed is the same as that of the man; her feet and legs must be supported in the same manner, and fixed with the ligatures beforementioned.

WHEN a man has the stone, it is very difficult to know, before the operation, what is the consistence, size, and surface of it; not only because the *catheter* enters but two or three inches into the bladder, but likewise because the curve described by the *urethra* in its passage prevents the free motion of the instrument; but the thing is easy in women, for as the *urethra* is straight, and also the *catheter* that we make use of, we may introduce it as we please, and move it about in the bladder in different directions, in order to feel the stone,
and

and to discover what kind of one it is : and hence we are to be determined in the manner of performing the operation,

WHEN the stone is small, or of such a moderate size as not to exceed the weight of an ounce or two, we should avoid making any incision, and rather imitate nature as much as possible, who to facilitate the passage of the child through the neck of the *uterus*, dilates it gradually by means of the throws and labour-pains. We must observe therefore to dilate the *urethra*, and the neck of the bladder in the same manner, without forcing them too much ; and in order to this, we first introduce the staff, which after serving to guide the beak of the *gorget* into the bladder is immediately drawn out. The *gorget*, which is larger than the staff, begins the distension of the *urethra*, and the neck of the bladder ; and by means of this we introduce a small pair of *forceps* made for children ; so that the bulk of this added to that of the *gorget*, encreases the dilatation, and with very little pain. We then draw out these *forceps* and pass in a larger pair, in order to make the distension still greater ; and thus we proceed successively till we can introduce a pair of *forceps* of a suitable size to that of the stone. This alternate introduction of the *forceps* employs perhaps about two minutes, but the delay is very inconsiderable when compared with the advantages arising from it.

AFTER this we draw out the *gorget*, and endeavour to get hold of the stone in the manner before directed, extracting it also with the same precautions. I have performed the operation in this manner on some women, who with the application only of a fomentation to the inside of the *vulva*, have been cured in less than a fortnight,
and

and at the end of that time have been able to retain their water.

THE operation is not so simple if the stone is large, the *urethra* and neck of the *uterus* not admitting a sufficient distension to let it pass. In this case an incision must be made as in men, or a dreadful laceration might ensue, which would necessarily be succeeded by an incontinence of urine, even supposing the patient survives the inflammation.

WHEN the staff is introduced into the bladder, we turn the groove in such a direction as to face the interval between the *anus* and the *tuberculum ischii*, in order to make the incision on that side, and a finger being introduced into the *vagina*, serves to direct this groove so as to prevent the cutting the *vagina*, which is to be avoided with the same care as injuring the *rectum* when we perform the operation upon men. This done, we pass the small bistory abovementioned along the groove, beyond the neck of the bladder, and immediately draw it back again, and thus the neck of the bladder and the *urethra* are divided. We are then to pass a finger along the *gorget* quite into the neck of the bladder, in order to open and dilate the whole passage as much as possible; which done, we introduce a proper pair of *forceps*, take hold of the stone, and extract it. And thus the stone comes away without much difficulty, as there are no *prostatæ* here to obstruct its passage as in men, but only a cellular substance, which either tears or distends in proportion to the bulk of the stone. In all probability too there is a laceration in the bladder, extending from the incision made at its orifice towards the body of it; but this could not be avoided, and would have happened

pened equally by the extraction of the stone, though no incision had been made, and might have proved, perhaps, more dangerous.

THE dressings are not so simple as when a small stone only has been extracted; since the parts that have been distended and lacerated will be apt to close too soon at the circumference of the neck of the bladder; for which reason it will be proper to introduce a *canula*, and leave it in for four or five days, till the suppuration is perfectly formed.

THE whole cellular substance that has been lacerated, and likewise that which has only suffered a distension, may inflame, and come to suppuration; in which case, the *canula* must be removed, and a tent armed with a digestive proper to hasten the suppuration be substituted in its stead. If the size of the tent obstructs the course of the urine, a very small leaden pipe may be inclosed within the tent to preserve a free passage. When the suppuration abates, it is a sign that the swelling of the whole circumference of the wound is gone off, and the tent may then be left out, applying only simple dressings.

I HAVE known a considerable abscess formed on the internal surface of the left *os ilium* (which was the same side where the incision was made) that did not appear till above six weeks after the operation. The cellular substance round the bladder, which inflamed and came to suppuration, yielded a discharge through the wound for above eighteen days, but at last this suppuration intirely ceased, and the wound healed. A little while after there appeared a redness in the skin of the *al domen*, and a hardness at the internal surface of the *os ilium*, four fingers breadth above the

bending of the groin. About a fortnight afterwards I felt a fluctuation, which induced me to make an opening, when I discovered that the *pus* was formed in the cellular substance investing the bladder, for the bottom of the abscess extended to its neck.

If a *canula* had been introduced immediately after the operation, it is probable this abscess might have been prevented, by preserving a free passage for the matter which ought to have discharged through the wound a longer time.

The method of treating patients in this distemper.

It is not barely sufficient to have extracted the stone: we must take care likewise to prevent such symptoms as may be expected to arise, and to remove those which appear at present.

SOME of these symptoms appear within four and twenty hours after the operation, others not till some days afterwards. Both the one and the other may proceed from the discomposure of the patient's mind, through the dread of the operation, from the pain that necessarily attends it, and from the inflammation which sometimes ensues upon it. But as the principal cause we must reckon the apprehensions of the patient at the approach of an operation where his life is concerned; apprehensions which greatly increase when the time of suffering draws near. I have seen many instances of people who have seemed by their discourse not only to be free from any dread of the operation, but even earnestly to desire it, and yet, upon entering the room where every thing was prepared for the performance, they have changed yellow as saffron. This alteration of colour is a certain proof of a very great

great revolution in the whole animal system, and is owing probably not so much to an agitation as a violent contraction of all the elastic parts, by which the circulation is obstructed, and many of the secretions may be thereby suspended. Agreeable to this notion, I have known such patients, during the eight or ten first days, affected with a variety of symptoms, as a fever, *flatus* in the bowels, costiveness, and in consequence of that a distension of the belly; afterwards a *diarrhœa*, &c. symptoms that could not be attributed to the wounded parts being inflamed, since no inflammation of any consequence had ensued.

THE pain that is inseparable from the operation, and which continues with more or less violence for above an hour, may occasion the like symptoms; and in order to be convinced of this, we need only with a microscope examine the effects which pain has upon an animal when wounded. We shall see that the fluids which pass through some of its vessels stop suddenly, and sometimes return back, which certainly must be owing to a spasmodic contraction or an antiperistaltic motion of all the fibres that compose these vessels: And why may not pain produce the same effect on the vessels of our bodies, and on the fluids that circulate in them? We should not be surprized therefore to find such accidents arise, since our health does not only depend upon the good quality of the animal juices, but also upon the regularity of their course, for we every day see that an irregularity in the circulation renders them diseased. We may venture then to ascribe the greatest part of the abovementioned symptoms as justly to pain as to fear: the convulsive shivering which usually comes on some hours after the operation, the slight inclination to vomit,

the continual faintings, and the inquietude and restlessness that affects the patient, must all proceed from the same cause.

To conclude; an inflammation of the parts affected may ensue in consequence of the operation's being ill performed, and sometimes indeed though done ever so well. This inflammation, which, beginning at the bladder, extends to the whole cellular substance that surrounds it, may reach to the *ureters* and kidneys. In which case those parts are affected with acute pains like those which the gravel occasions. If the inflammation extends to the *peritoneum* and the intestinal canal, it brings on an antiperistaltic motion of the intestines, attended with pains all over the belly and frequent *nauseas*; and if it still increases, a gangrene soon seizes on all the parts where the inflammation fixed itself. An increase of the fever, continual pains, and a swelling of the *hypogastrium* are the first symptoms; a tension of the whole *abdomen*, a hickup, and perpetual restlessness and vomitings soon follow; at last, the pulse becomes convulsive, the patient sinks, and soon dies.

Of all the symptoms beforementioned, that which strikes the by-standers least, and which nevertheless demands our greatest attention, is the spasmodic tension of the whole nervous system, which disturbs the order of the circulation, and may produce an obstruction; which obstruction is more to be apprehended, as the fluids, when once stopt, do not easily return to their natural course, and other obstructions, which may be formed in consequence of the former, may also degenerate into an inflammation. The inflammation, which sometimes after the operation seizes on the bladder, and the parts near the wound, is likewise
a symptom

a symptom which deserves our utmost care to prevent, as its progress may be very quick. We every day see that the same remedy conduces to abate one of these symptoms, and to prevent the other. I have learnt by experience, of how great efficacy oils are to relax the spasmodic and convulsive tension of the whole nervous system; nor are their virtues less effectual in inflammations, especially in those of the *abdomen*. As soon therefore as the patient is laid in his bed, I order him to take between two and three ounces of oil of sweet almonds. The greatest part of this oil passing along the intestinal canal, lubricates the intestines, and by relaxing them may prevent their being irritated; at the same time it promotes the discharge of the *feces*, for we generally find in a few hours the patient has stools. Whilst part of the oil passes along the intestines, another part of it enters the lacteal veins, and mixes with the fluids: there it distributes itself to every part of the body, and abates the disposition to tension. I repeat the same dose about once or twice a day: And perhaps it is to this method I owe the success of my operation.

BLEEDING is also necessary and of great service, but cannot always be immediately used. I have seen some patients, after the operation, continue for many hours in so weak a condition, that it was more necessary to think of raising their spirits and invigorating, than to lower them by bleeding. This weakness certainly did not proceed so much from the loss of blood, since they had not lost above three small porringers, as from a spasmodic tension in the whole body. It has been in these cases that I have observed the convulsive shiverings beforementioned to come on sometimes two or three hours after the operation,

or even sooner; after which the pulse rises, and as soon as the shivering is over, I bleed the patient, repeating it, if necessary, in a few hours. An exact regimen and emollient draughts ought to be used for the same end.

If the bladder is in danger of an inflammation, we may discover it by the tension of the *hypogastrium*, which swells, and is painful when touched; if the intire *abdomen* is in danger, the tension soon seizes on the whole. In this case bleeding in a large quantity is proper; repeating it occasionally according to the patient's strength. The oil of sweet almonds should likewise be continued both as an emollient medicine, and as a laxative to procure an useful evacuation by stool.

If the symptoms are moderate, we find them gradually abate as the suppuration comes on. I do not mean here those symptoms which may appear several days after the operation; for as we cannot foresee what they will be, we cannot direct proper remedies, but in this case we are to consult what are the different curative indications. Supposing none arise when the suppuration is formed, yet we must not on that account be less strict in the regimen, not only because a patient, confined in his bed, requires less nourishment, as he has a less waste of spirits, but because the least indigestion might disturb the whole cure.

As lying in bed renders the belly costive, a clyster should be administered every two or three days, to carry off any excrements that might ferment in the intestinal canal; and sometimes a gentle purge should be given, to excite nature to throw off what might be lodged in the small guts, and which clysters, as they do not reach so far, cannot possibly bring away.

Of

Of Fistulæ succeeding the operation.

WHEN the operation is performed, and the wound almost healed, a *fistula* may yet remain, through which part of the urine may pass from the bladder: and this may proceed from various causes.

THE thin and weak state of the patient may be one reason, and this is often owing to his constitution; but the distemper, and the low diet to which he has been confined, may have contributed; in which case, we can hardly hope to heal the *fistula* till he has recovered his flesh, and then, upon examining the *fistula*, we find its sides are grown very hard and callous. I have cured several of these by putting a small catheteric torch into them, which consumed the callosities, and the wound soon after closed. Care was taken in these cases to keep the patients in bed, with their knees tied together, that they might not, by stirring, prevent the re-union.

THE wound may likewise become fistulous, from a necessity of keeping it long open with a *canula*, to preserve a passage for any gravel or pieces of a stone that were broke off in the operation. This *fistula* may also be healed by the means before directed.

THE third cause of a *fistula* is the dilatation of the neck of the bladder, which, not having contracted itself, cannot retain the urine; and it is obvious that as long as the urine passes through the wound, it not only washes away the nutritive juice which should form the fleshy granulations and the *cicatrix*, but it also hardens the flesh in its passage, by the salts with which it is impregnated. We

cannot therefore hope to cure this *fistula*, till nature has restored the tone of the neck of the bladder so as to retain the urine for some time, and prevent its running out as fast as it comes in. The wound may also continue fistulous from a stricture in the *urethra*, produced by some former disorder in that canal, and therefore the surgeon ought to inform himself how the patient discharged his urine before the operation. If he could not make water in a full stream, it must be owing to a contraction of the *urethra*, and no wonder the urine coming from the bladder should preserve to itself the more easy passage through the wound: in this case the surgeon must enlarge the *urethra* with *bougies*, as we shall observe in treating of the *fistula in perineo*; which is the only way either to prevent or cure this *fistula*.

Of an incontinence of urine.

AN incontinence of urine may remain after the operation has been performed on either sex, and is owing to a weakness in the neck of the bladder, which cannot sufficiently close itself to prevent the urine from running out. In men this accident may have been occasioned by the situation of the stone before it was extracted, or it may have been owing to the operator.

It must be imputed to the first of these causes, if the stone has been lodged a considerable time either entirely or partly in the neck of the bladder, as has sometimes happened. If it has continued there long, and increased, it has gradually dilated the neck of the bladder, so as to destroy its power of contracting itself sufficiently to retain the urine; nor can the surgeon possibly remedy this:

O F T H E S T O N E. 265

It is altogether the work of nature, and not to be effected even by nature herself but gradually, according to the different degree of dilatation which the stone has made.

THE surgeon may have occasioned this disorder, by making a too great, or an irregular laceration in the neck of the bladder; or the same thing may happen from the largeness of the stone: and it was upon this consideration that I advised the dividing of the *urethra*, the neck of the bladder, and the prostate gland, previous to the extraction; being convinced that the laceration caused by the stone in passing out will follow the same direction as the incision. Add to this, that it will occasion very little loss of substance. Nature only, as I observed before, can remedy this disorder; and, when it does so, requires a considerable time to bring it about. Would it not be proper therefore to make the patient wear the *constrictor penis* or yoke? I think not: this instrument might indeed be useful for some time, but would certainly bring on another complaint; for the urine continually filling the *urethra* as well as the bladder, would by degrees dilate that, and might break open the cicatrix in *perineo*; and the *fistula*, which would consequently ensue, joined to the incontinence of urine, will be an additional disorder, and likewise incurable.

WOMEN are more subject to this complaint than men, as in them the neck of the bladder is not invested with the prostate gland, which strengthens that part. It is impossible to avoid either dilating or dividing the orifice of the bladder in order to extract the stone; and when the stone is large, it must necessarily make a dilatation and laceration proportionable to its bulk, or it could not pass. This is indeed a great misfortune to the sex, but
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the only method to prevent it is to have recourse to the operation in time, before the stone is arrived to any considerable size.

Of Stones in the urethra.

WE sometimes meet with an extraneous body lodged in the *urethra*. That most usually found there, is a stone, not formed in that part, but stopt in its passage from the bladder, being forced and carried along by the urine, till it meets with an obstruction. Two things may conduce to this accident; first, the size of the stone, if it exceeds the diameter of the canal; secondly, its unevenness, if it is of an angular or an irregular figure. A stone may lodge in three different parts of the *urethra*, viz. in the membranous part situated on this side of the *glandulæ prostaticæ*, between the neck of the bladder and the bulb of the *urethra*; secondly, in the *fossa navicularis* near the *frænum*; or thirdly, in some part of the canal along the *penis*. In such persons as are subject to nephritic pains and frequently void gravel, some of it may happen to lodge between the neck of the bladder and the bulb of the *urethra*, and may increase there; but this is an accident more common to patients who have been cut, the canal being enlarged in this place by the operation. The softness of the canal, which there more particularly stretches and gives way to the bulk of the stone, frequently occasions it to increase in that part, without either obstructing the passage of the urine or giving the patient pain; in this case, the canal grows larger insensibly, and being constantly dilated, becomes thinner and thinner; and what is remarkable is, the urine always preserves itself a passage

passage by making a kind of gutter or groove in the stone.

THE *urethra*, being thus preternaturally distended by the stone, at last bursts, and by examining the *perinæum* we may feel the hardness of an extraneous body; nor is it impossible for the stone in time to penetrate through the outward skin, as it had done through the *urethra*: an instance of which may be seen in my *Observations*, p. 276. But though the stone may push out thus by piercing the skin, it would be improper to let it increase so as to open itself a passage there, since in that case an incurable *fistula* would be the unavoidable consequence.

WHEN therefore we are certain that a stone is lodged in this part, we should make an incision *in perinæo* upon the stone itself, and extract it.

THE stone may prove to be of a very irregular figure, and it has sometimes been known to extend along the neck of the bladder quite into its cavity; in which case, that part of the stone which is in the bladder, is generally larger than that in the *urethra*.

THOSE who have extracted those stones, are sensible that, either for this reason, or because of their irregular figure, which keeps them in a manner buried within the flesh, it is very difficult to make an incision upon the stone itself, sufficient to extract it easily; I would propose therefore, first, to make an incision *in perinæo* of a proportionable length to the size of the stone, and then penetrate deep enough to lay the stone bare, so as to reach it with the finger. This done, we pass a *director* along the stone, and introducing a bistory in the groove of the *director*, enlarge the incision at the bottom of the wound; for the stone being exactly inclosed, and as it were buried within
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the cellular substance of the *perinæum*, we cannot otherwise lay hold of it with the *forceps*: and if by examining with a probe, we find that one end of the stone extends into the bladder, we ought to pass in the *director* there, and with a bistory make a sufficient opening in the neck of the bladder; since otherwise the stone might break in drawing it out, and that part of it which is in the bladder would continue there,

THE stone being brought away, there only remains a simple wound, unless there be any *callosities*; in which case we must endeavour to dissolve them by suppuration, and when that is effected, we must try by proper medicines to procure a re-union.

THERE are several cases where the wound does not close without difficulty; as first, when that part of the *urethra* which extends along the *penis*, is contracted; for then the urine that cannot pass easily through the *penis*, issues through the wound in the *urethra*, and hinders it from healing. The only way to prevent the wound's becoming fistulous in this case is, by dilating the *urethra* with the *bougies*, for the wound will never heal till that is enlarged.

A SECOND case wherein there is room to fear the wound will always remain fistulous, notwithstanding our utmost endeavours to the contrary, is when the stone has extended itself into the neck of the bladder, and by continuing there has very much dilated it; for as this part, when distended, cannot readily close so exactly as before the stone had lodged there, the urine flows continually through the wound, and prevents its healing; we must not therefore expect a cure, supposing it to be at all practicable, till the neck of the
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the bladder has had sufficient time to contract in such manner as to retain the urine. This contraction is entirely the work of nature, and should we succeed in curing the wound before the neck of the bladder is sufficiently closed, the patient would necessarily lose the power of retaining his urine, which would be a disorder almost as troublesome as the *fistula*.

IF the stone is lodged near the extremity of the *penis* in the *fossa navicularis*, it may be generally turned out with a *scoop*; but if any points or inequalities of the stone stick in the internal coat of the *urethra*, we must first disengage them by introducing a fine probe beyond the stone, and then passing it all round. If this cannot be done, the orifice of the *glans* must be enlarged by a small incision, terminating at a distance from the *frænum*; after which the *scoop* being conveyed behind the stone, brings it easily away.

IF the stone is lodged in the *urethra* along the *penis*, and cannot be moved by the course of the urine, we must compress the *penis* moderately just above the stone to prevent its returning back, and then inject some oil into the *urethra* to lubricate the passage; we afterwards introduce a small *scoop* beyond the stone, and endeavour to extract it. If the inequalities of the stone prevent its coming forward, a fine probe may be introduced as was before directed, and the *scoop* passed in afterwards. If these methods fail, the operation must be immediately performed to get the stone out, as its lodgment there stops the passage of the urine.

IN order to perform this, we begin with drawing the skin of the *penis* towards the *prepuce*, and taking hold of the *penis* where the stone is lodged, we place the left fore-finger and thumb,
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one above and the other below the stone, whilst the middle finger, being placed upon the *corpus cavernosum*, directly upon the stone, fixes it and makes it press outwards. We then make a longitudinal incision in the *urethra*, with a straight bistory, upon the stone; and if its inequalities hinder the edge of the knife from making the incision sufficiently large, we must finish it by passing the point between the *urethra* and the stone, and cutting from within outwards. This done, the stone comes away of itself, or is easily extracted with a *scoop*. Immediately we retract the skin of the *penis*, which we had before drawn forwards, whereby the internal wound is covered, and prevents the urine from passing that way. In order to retain the skin at the root of the *penis*, so as to prevent its returning back towards the *glans*, which would render the incision of the *urethra* and that of the skin parallel to each other, it must be fixed with an adhesive plaster on the *pubis*.

A LITTLE dry lint and a circular bandage is sufficient for the dressing, and the wound will soon heal.

Of the FISTULA in PERINÆO.

THOUGH every *fistula*, strictly speaking, which is seated between the *anus* and the *scrotum*, may be included under this denomination, yet custom has appropriated the name to that only which is situated in this part, and gives passage to some of the urine that issues from the bladder.

THIS *fistula* is an opening in the skin corresponding to another in the *urethra*, and therefore may be compared to a complete *fistula in ano*,

where there is an opening in the *rectum*, by which part of the excrements sometimes escape and pass out through the orifice in the skin.

The difference of fistulæ in Perinæo.

THE *fistula in perinæo* is of the same nature with all other *fistulæ*, in respect to its outward opening being small, and surrounded with callosities; but there is this difference in the *fistulæ perinæi*, that some have only one external opening, others have several, through which the urine passes, as out of a watering-pot. These openings are not always in the *perinæum*, being sometimes found in the buttock, in the *scrotum*, and even in the groin. I have seen them also round the *anus*, where they were taken for *fistulæ ani*, and treated as such.

ONE would naturally conclude, from viewing these numerous openings in the skin, that the *urethra* was pierced in more places than one, and yet we find by experience that one single opening in that is sufficient to produce several externally; for upon examining the bodies of such as have died and have had this complaint, no more than one opening has ever been found in the *urethra*, though there were several in the skin. This opening generally happens between the neck of the bladder and the bulb of the *urethra*, and it is reasonable to suppose, that the *urethra* should be penetrated sooner in this part than any other, as it is here of a loose and somewhat membranous substance, whereas from the bulb to the *glans* inclusively, it is of a strong aponeurotic texture.

CAUSES. An abscess may be formed in *perinæo*, and the matter penetrate the *urethra* in the same manner as those abscesses which are formed in the fat investing the *rectum*, the matter of which perforates

perforates that intestine. In such a case, part of the urine issuing through this orifice may render the ulcer fistulous.

THE incision made *in perinaeo* to extract a stone from the bladder may not happen to close exactly, and this may occasion a *fistula*; but these cases are uncommon, and the *fistulae in perinaeo* generally owe their origin to some disorder in the *urethra*.

THE most usual cause of disorders in the *urethra* is a clap ill cured, and indeed sometimes a cure judiciously treated may be attended with this unlucky accident. This, I say, is the most usual cause, for I have known patients who, without ever having had any venereal complaint, have yet had their *urethra* so contracted that the urine would hardly pass but by drops. In claps, there are ulcers in the *prostate*, and oftentimes small ulcers in the internal coat of the *urethra*; the whole length of the canal: now though the ulcer in the *prostate* may be healed by the application of proper remedies, yet those glands always remain larger than they were before the disease happened, and they compress the neck of the bladder in such a manner that the urine passes with difficulty and in a smaller stream. By this means the course of the water being retarded in the membranous part of the *urethra*, by passing from a narrower canal into a larger, it often causes some drops to remain there. Again, the small ulcers that arise in the internal part of the canal, as they cicatrize, lessen its diameter, for every *cicatrix* contracts the part. Hence the urine is not discharged in a full stream, and not only some drops may remain in the *urethra* and lodge there, but the difficulty the urine meets with in passing tends

tends to dilate the canal in its weakest part; for the urine acts against the sides of the *urethra* in proportion to the resistance it meets in those parts that are contracted. This dilatation is another reason why some drops should lodge behind, and this will certainly be in that part of the *urethra* which is situated between the *prostatæ* and the bulb; not only because the *urethra* is of a looser and almost membranous texture in this place, but likewise because, in the natural position of the body, whether standing or lying, this part of the canal is situated lower than the rest. It is in this part therefore that some drops of urine lodge and corrupt till they are carried away by fresh urine. Here it inflames the internal coat, and soon produces an excoriation, which degenerates into an ulcer, and may be the origin of several different disorders. In some of these ulcers a *fungus* arises; in others the ulcer pierces the internal coat of the canal; and in others again, both the coats are opened, and the urine, insinuating itself into the cellular substance of the *perinæum*, produces abscesses there, which give rise to *fistulæ*.

It is proper to observe, that in all these cases, where the urine passes through the *urethra* with difficulty, the bladder hardly ever discharges its contents entirely, and the urine which lodges in that receptacle gradually renders it diseased.

PROGNOSTIC. When experience has once taught us the difference of these disorders, it will not be difficult to form a just prognostic of them, and this prognostic will be according to the circumstances that attend. As they proceed from a lodgment of the urine in the membranous part of the *urethra*, which lodgment is occasioned by a contraction of some part of the canal, we may in

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general pronounce them curable, provided a free and easy course be procured for the urine by enlarging the canal; it being nature's design that the urine should be freely discharged this way: and we may further add, that if we fail in answering this intention, all other assistance of surgery will prove ineffectual.

WE will now return to the ulcer in the membranous part of the *urethra*; and though the disorders which spring from thence may be, and indeed generally are, discovered with it, yet I think it will be best to treat of them separately.

Of fungous flesh in the urethra.

THE fungous loose flesh produced by the ulcer may be justly termed a carnosity, and as it is often moistened by the urine, it soon ceases to be flabby, and becomes callous, forming a kind of mass between the neck of the bladder and the bulb of the *urethra*, thereby obstructing the course of the urine in a greater or less degree. In some, the urine passes only in a very small stream; in others, but by drops, or can hardly be discharged at all. The disease may continue in this state some little time, but the urine will at length penetrate the *urethra*, and what was before only a carnosity will degenerate into a *fistula in perinaeo*. The only means to prevent this is, by softening the callosities, bringing the ulcer to suppurate, enlarging the canal, and in a word, by removing the original cause of the disease.

ALL these intentions may frequently be answered by the use of *bougies* armed with medicines agreeable to the state of the disorder, and carefully introduced through the *urethra* into the bladder.

bladder. The medicines made use of on these occasions should by no means be irritating; and for this reason I should absolutely reject the use of any caustic introduced into the *urethra* on pretence of destroying the carnosities, since, as I have learned from experience, they serve only to eat into the canal.

THESE *bougies* are made either of cat-gut; of linen dipt in wax and rolled; or of linen waxed and rolled upon the cat-gut. The second kind of these are improper to be used, as they soften in the canal by the heat of the part, and cannot readily be passed into the bladder. The size of the first *bougie* that is to be introduced may be determined by observing the size of the stream of urine; and in order to introduce it, we take hold of the *penis* at the *corpora cavernosa* below the *corona glandis*, being careful not to compress the *urethra*; with the same hand we extend the *penis* a little, in order to streighten the *urethra*, if it is curved, as sometimes happens, and to smooth any wrinkles that may be formed by the internal coat, which might otherwise stop the end of the *bougie*. By this means likewise if there are any strictures in the passage, we are sure by extending the *penis* to contract those parts of the canal where there are none, and to render them for the time almost of the same diameter as the parts in which these strictures are situated. We learn from anatomy, that the whole extent of the *urethra* is furnished with *lacunæ* which open into its cavity; and as the *lacunæ* open into it from behind forwards, these strictures sometimes, if they are not produced by *cicatrices*, are nothing else but the mouths of the *lacunæ* affected with a spasmodic contraction from the dis-

276 OF THE FISTULA

order of the *urethra*. Taking hold therefore of the *penis* with one hand, as was before directed, below the *corona*, we with the other introduce the *bougie* as far as we can into the *urethra*, and if possible, into the cavity of the bladder. In proportion as the *bougie* advances into the canal, we frequently feel strictures, which it gets beyond, meeting also with others which prevent its advancing, and quite stop it. In this case we must draw back the *bougie* so as to disengage it, and then turn it a little, after which we must again push forwards, feeling and searching as we go. If we cannot possibly get the *bougie* farther, we must leave it where it is, contenting ourselves for that time with having made some progress. We must then cut off the *bougie* within a finger's breadth of the *glans*, and fasten it to a thread to prevent its coming out, twisting the thread round the crown of the *glans*.

THE *bougie*, which, by the moisture of the part, swells in the *urethra* during its continuance there, in some measure removes the strictures it passed by at its entrance; and on pulling it out in an hour or thereabouts (for it must not be left in longer) you will find it twice as large as when it was put in. Next day another must be introduced of the same size, which easily gets beyond the first strictures that had given way to the former *bougie*, and sometimes we are so fortunate as to get past fresh obstacles: thus gradually gaining ground, we at last get into the bladder. When we have passed in the *bougie*, we must fasten a thread to that end of it which remains out at the orifice of the *glans*, in order to withdraw it easily in case it should slip into the *urethra*; or, as has been known to happen, for fear the *bougie* should pass entirely into
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into the bladder. In 1735, I cut a man, from whom, instead of a stone, I extracted a *bougie* of rolled and waxed linen without cat-gut. It was a foot long, and had been left in the bladder, where it was collected in a lump. After the *bougie* has been passed two or three times, we must make use of a larger one; that is, one of the same diameter as the other when swelled. This second *bougie* swells in the same manner, and enlarging the canal still more, the urine begins to discharge with greater freedom. When the *bougies* of cat-gut enter readily, we must use those that are made of linen rolled neatly upon the cat-gut: these will not adapt themselves to the preternatural windings of the *urethra* as the former did, when they became soft, but on the contrary will new mould and streighten the canal; and thus by little and little we enlarge the size, till we have dilated the *urethra* sufficiently.

It is proper to observe, that, in order to facilitate the introduction of the *bougies*, we must bend the small end a little that goes in first, that it may adapt itself the more readily to the curvature of the *urethra*; and they must be rubbed either with oil, or some emollient, resolvent, or drying ointments, according as the case requires.

THE use of *bougies* often occasions a suppuration in the *urethra* almost like that of a *gonorrhœa*: this suppuration is frequently very beneficial in dissolving the callosities, and continues no longer than whilst the *bougies* are used.

WHEN by such means the canal is restored to its natural diameter, the ulcer is soon healed by the use of drying *bougies*, and a *fistula* no longer to be apprehended; but we find by experience that whenever the *urethra* has been thus dilated,

278 OF THE FISTULA

it is apt in time to contract again, and to be subject to the same symptoms. I have known this happen three years after the cure was first effected.

THE patient may easily become sensible of this by observing the stream of his urine; but, in order to prevent a relapse, he ought every seven or eight days to use a *bougie* or leaden probe of a proper size, and to leave it an hour or two in the passage.

IF the urine penetrates the internal coat of the *urethra*, some drops of it will necessarily insinuate themselves between that and the external coat. Now between these, as we learn by anatomy, there is a cellular substance almost like that of the *corpora cavernosa*; like that also it is tendinous, and swells in erection. A small quantity of urine getting into this, and insinuating itself from cell to cell, hardens the substance and renders it callous and contorted, so that it feels like a very hard cord running along the *penis* and the *perineum*. The urine in this case passes with difficulty, and in a greater or less stream according to the degree of disorder, as may be seen by directing the patient to make water; when the urine being restrained in its passage forces against the sides of the canal, whereby it dilates them in the membranous part, and more easily lodges there. This causing the disorder to encrease daily, the canal is entirely penetrated, and in time are formed *fistulae in perineo* that prove very difficult to be cured. The only means either of stopping the progress of this disease or curing it, is to dilate the canal by *bougies*; by means of which we are likewise enabled to apply proper remedies to the ulcer.

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IN this case the *bougies* are with difficulty introduced, as the strictures formed by the contraction of the canal in different parts of it are not easily passed over. At first we can only introduce a very small *bougie* of cat-gut, the flexibility of which allows it to adapt itself to the winding of the *urethra*, and will not be liable to force itself any new passage by penetrating the *urethra*. Thus we must patiently endeavour to surmount a single obstacle first, and then another, without attempting to reach into the bladder at once.

WHEN the easy introduction of the *bougies* will allow of using those made of the waxed linen rolled upon cat-gut, they by their solidity may streighten the crooked canal, and may also be armed with proper medicines, either to promote a suppuration or to cleanse and dry up the ulcer occasioned by the lodgment of the urine in the membranous part: after which the water begins to have a free passage through the canal, and no longer obstructs the cure.

IF the urine gets through both the membranes of the *urethra*, and diffuses itself into the cellular substance, the urine will pass from cell to cell, and continuing there some time as an extraneous body, will unavoidably produce an inflammation, and in consequence thereof an abscess. The matter of these abscesses pierces through the skin in one or more places, and the urine flowing thither continually, preserves itself a passage by preventing these openings from healing. Some of this urine passing through these orifices with difficulty will lodge in the neighbouring parts, and hardening the flesh there, will produce callosities, which afterwards increase very considerably. In proportion to the number of these callosities, and to the

difficulty the urine meets with in passing, the water works itself new passages, and forms new abscesses; and hence it comes to pass that we sometimes find urinary *fistulae* extend even into the groins. It is not a very uncommon thing to find stony concretions here, from the lodgment of the urine in the flesh before it makes its way out through the fistulous openings.

WE are taught by the rules of surgery, that in order to cure a *fistula*, the outward opening must be enlarged, and the callosities extirpated or destroyed; but as the *fistula in perinaeo* differs in many particulars from other *fistulae*, we must not always adhere to this rule: and, to set this matter in a clear light, I will suppose different cases to occur.

AND first, I will suppose a patient who has one or more fistulous orifices through which both matter and urine come away; that this disorder being of some standing, we may feel several callosities deep in the *perinaeum*; and that, upon directing the patient to make water, we find the urine passes with difficulty and in a very small stream.

IN such a case, the first intention to be answered is to enlarge the *urethra* that the urine may have a free course. This we are to attempt with the *bougies*, for the canal is so contracted as not to admit a *catheter*. In proportion as the canal is enlarged, less urine passes through the *fistula*, and we frequently find the callosities sensibly softened, and sometimes the fistulous openings heal up of themselves: a pretty sure sign of an approaching cure. Thus I have often known *fistulae in perinaeo*, which were very considerable from the multiplicity of their openings, close of themselves, and do perfectly well only by the use of *bougies*; nor
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need we be surprized at this ; for when the natural passage is opened, the urine of course passes through it, and no longer forces against the sides ; after which the preternatural opening in the *urethra* gradually closes, and nature endeavours to dissolve the remaining callosities by suppuration ; as also to fill up the cavities and to form the *cicatrices*, as she oftentimes does in very large abscesses, that have opened of themselves, and have healed with a simple plaster only ; which plaster could not possibly be of service in filling up the cavity caused by the abscess.

ALL these efforts of nature however cannot heal those *fistule* where there are stony concretions, or where the callosities are too much confirmed. These cases require the assistance of art ; and in order to effect a cure we must follow the general rule of enlarging the outward opening to procure a passage for the extraneous bodies, and dissolve the callosities.

It may be proper to repeat here, that, in order to prevent a return of the disorder, the patient ought once a week, for some years, to use either a *bougie* or a leaden probe, which, though an inconvenience, is preferable to a return of the disorder.

LET us suppose now that the *urethra* is become so callous and contorted that it is absolutely impossible to introduce a *bougie*. In this case very little urine passes through the *penis*, and the callosities and *fistule* are numerous. I have sometimes seen the *scrotum* so loaded with callosities, that together with the *perinæum*, it appeared but one lump of them intermixed with fistulous holes. The more callosities there are, the more the passage of the urine is obstructed, and the patient

patient probably will soon die under such circumstances.

THE means of removing this disorder is by one or more operations. As the *bougies* cannot enter the *urethra*, the staff cannot be made use of to conduct the knife into the bladder: in such cases the operator may derive great advantages from the knowledge of anatomy, by which he is acquainted with the structure of the *urethra* from the *scrotum* to the bladder, and thereby avoids cutting into it improperly. The method of proceeding on this occasion cannot be better shewn than by giving an account of a similar case, with the means which were used in the cure.

IN 1730, I attended a patient who had such a number of callosities in the *perinæum* and *scrotum*, that I could not distinguish the testicles; the *scrotum* and *perinæum* forming, as it were, one shapeless lump. These callosities had about thirty fistulous holes in them, through which the water passed only in drops. Very little urine came away through the *penis*, and as I could not introduce even the smallest-sized *bougie*, I judged that the only method of curing this patient must be by an operation. Having therefore prepared him by twice bleeding, I placed him in the same posture as in cutting for the stone, and made a very long and deep incision into the callosities on the *perinæum* near the part where I imagined the *urethra* to be, for I could not justly distinguish it; and with a second cut, I took away part of the callosities on the side of that branch of the *ischium* which rises towards the *os pubis*, immediately filling up the wound with lint. The next day I placed the patient in the same posture to take off the dressings, and having

having removed the lint, and directed him to make water, I observed the urine to pass through at several places : I introduced a piece of *bougie* into the orifice that seemed nearest the *urethra*, and left it there ; but it was impossible to put in above an inch of it, on account of the winding of the fistulous *sinus*. I then dressed the wound with a simple digestive, taking care to keep the lips open. The same dressings were repeated the two succeeding days, and at each time I passed the *bougie* a little farther into the *sinus*. In short, the fifth day it entered into the *urethra*, of which I was fully convinced when, on pushing it forward, it passed into the bladder. Having gained our point thus far, I conveyed a *director*, the end of which was open, along the *bougie*, and having drawn away the *bougie*, the groove of the *director* served to pass in a *bistoury*, with which I opened the whole passage to the neck of the bladder inclusively ; making the same incision as for the stone, and taking care to avoid cutting the *rectum*. This done, by means of the same *director*, I passed in a leaden *canula*, one end of which entered the bladder, and the other was fixed by the bandage even with the skin of the *perinaeum*. The rest of the wound was dressed in the common way.

THE urine coming freely through the *canula*, passed no longer through the preternatural openings which it had before formed for its passage, and the callosities were partly dissolved. The *urethra* began to admit the introduction of a *bougie*, so that I could pass in a small one very well as far as the wound. Having, by the use of different sized *bougies*, dilated the *urethra* to a certain degree, I judged it necessary to produce a suppuration by a more effectual method than what we could

could procure by them, and therefore introduced a small *catheter*, the eyes of which coming out at the wound, I passed a thread through them, and by withdrawing the *catheter* I brought out the thread through the *penis*. This thread served to pass in a *seton*, which I armed with a mixture of *ungt. dialthææ* and *empl. c Gum.* melted together, and changed it at every dressing. We continued this method three weeks, during which time the wound suppurated very considerably, and all the callosities were dissolved, so that the wound became like that of a patient who has been cut for the stone about three weeks.

I THEN removed the *canula*, and passing the *catheter* through the *penis* into the bladder, let it remain there between five and six days, in which time the wound, that was entirely left to nature, in a great measure closed. I then took away the *catheter*, and suffered the wound to heal entirely, which it did in about a fortnight with the most simple dressings.

I ADVISED the patient afterwards to the use of *bougies* or a leaden probe, without which the *urethra* might gradually contract again, the *cicatrix* open, and the disease return.

I WILL now suppose that the urine, instead of causing those small abscesses which produce *fistulae*, has inflamed the whole cellular substance of the *perinæum*, and formed one of those large urinary abscesses, which, extending sometimes to the *scrotum*, brings on a suppuration throughout the whole cellular substance of these parts. Whilst the *pus* is forming, the *urethra* is affected by the inflammation, and occasions a retention of the *urine*, for which we are frequently obliged to introduce the *catheter*. All the other symptoms that are common

mon to the formation of large abscesses in general, attend also in this case.

As soon as ever we perceive a fluctuation in these abscesses they must be opened in their whole extent, or the matter entirely separates the neck of the bladder from the cellular substance that invests it, and *sinuses* form there, which sometimes extend very far. The wound is to be dressed at first with dry lint, like other abscesses.

It will be absolutely necessary to use the *catheter* to draw off the patient's water till the first dressings are removed; but after that, he generally discharges it without its assistance, and you may depend upon seeing some of it pass through the wound. Upon observing the stream of urine which passes through the *penis*, we shall certainly find it smaller than it ought to be, and this it was that occasioned the disorder: the use of *bougies* therefore must be speedily recurred to, or the wound will remain fistulous. The reason of this is plain: the urine had formed itself a new passage, by the natural one being contracted, and not performing its office; and if the *urethra* is not as open as it should be, the water will either preserve itself a free course through the preternatural opening already made, or will form new ones. As to the dressings, they are to be suited to the time the disease has continued, and the state it is in.

A SUFFICIENT time must be allowed to dilate the *urethra* by the *bougies*, which should be very gradually enlarged. If the use of these was deferred till the wound was filled up and required only cicatrizing, we should thereby lose a great deal of time, and the edges of the wound, instead of cicatrizing, would probably become callous. For these reasons I would recommend the use of
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the *bougies* as soon as ever the digestion is pretty well established, at which time the relaxation of the parts that were obstructed renders the introduction of the *bougies* more easy.

I ADVISED, in the observation preceding this, that a *catheter* should be passed into the bladder when the wound is almost filled up, because as in that case the callosities were very numerous, and I cut away part of them, it might have happened that the internal *cicatrix* would have rendered the canal crooked; but in this, where there are no callosities, that accident is less to be feared, and I think we need not use the *catheter*.

I HAVE not taken notice, in any of the cases before recited, either of bleeding, a regimen, fomentations, cataplasms, or other remedies which might occasionally be found necessary in the course of the distemper, as I thought it improper to break into the order of the disease, and of the assistance that might be administered by operation only. There are general or particular remedies made use of by surgeons in almost all cases, and of which we have already treated in the preliminary chapter of operations. The circumstances, which differ in almost every case, can alone direct which of those remedies is to be preferred.

I WILL only add further, that as all *fistulae in perineo* may in several particulars be different, so none but general rules can be laid down for the treatment of them. The case just related, and some others that may be found in my *Observations*, may be useful in furnishing the young practitioners with such hints towards effecting a cure, as by reflexion may be brought into practice, and be adapted to the different circumstances of their patients.

[287]

Of the CANCER.

THE writers who have treated this subject, have represented a *cancer* as a fordid, spreading ulcer, and have looked upon it as incurable; but this definition is not adapted to the *cancer*, either when incipient or during its progress.

IN order that we may omit nothing relating to this disease, I shall begin with it from its first appearance, and shall endeavour to trace it through its several variations.

EVERY *cancer* begins by the obstruction of one or more glands, and is at first only a tumor formed by obstruction; but afterwards it becomes schirrous, and then carcinomatous.

WE find by experience that the conglomerate glands are most subject to this distemper; but as every gland may become schirrous, so every gland may likewise become carcinomatous; and as every part of the body is furnished with glands, so every part may consequently be subject to a cancer; thus we discover them situated in various places, sometimes even in the skin.

WITHOUT regarding the several distinctions which authors have made of this disease, I shall speak of it as of a *schirrus* susceptible of alterations; for as the glands differ both in their structure and the nature of the fluids which pass through them, so from hence must necessarily arise a difference in the schirrous tumours and cancers which are formed in different glands.

CAUSES. The compact structure of the glands, and the contortion of their vessels, prevent any obstruction once formed in them, from being easily

easily dispersed; and the fluids being confined there, may by their lodgment change their nature and become acrimonious. So long as the fluids remain unaltered, the tumor is no more than a species of *schirrus* that encreases more or less, but as soon as the fluids are vitiated the tumor becomes carcinomatous. I do not say that they all become so from the time of the obstruction; I only say, that this may happen, which depends entirely upon that kind of alteration with which the fluids so obstructed are affected. If it was possible to determine the alterations that happen in these fluids, we might easily explain, why some of these tumors become carcinomatous in a little time, even whilst they continue very small; why others do not undergo this change till after a considerable time; and, in short, why others increase very much before they alter their disposition, and at last become very painful, yet without any apparent inflammation, and even without any change of colour in the skin. But our knowledge of the fluids is too limited to enable us to determine what produces this change, and if we speak ingenuously, we cannot avoid confessing that we are but imperfectly acquainted with them in their natural state; how then can we presume to speak affirmatively of their morbid state, and explain all the degrees of alteration which they undergo? Of the two, it would be easier to account for what happens to wine, which after being squeezed from the grape, may turn sour, oily, bitter, or become an excellent liquor. In this obscurity then, let us confine ourselves to what our senses teach; and, without losing time in vain reasonings, which would be subject to contradiction, let us be satisfied with knowing that the ob-

obstructed fluids, which form schirrous tumors may corrupt; that they sometimes are vitiated to that degree as to become caustic, and corrode the vessels where they lodge; that consequently what was at first but a schirrous swelling, changes to a *carcinoma*, and afterwards an ulcerated *cancer*. My deceased father having cut off a carcinomatous tumor from a lady's breast, in the middle of which was a *cystis* filled with a fluid; I opened it, and part of its contents spouting out upon my cloaths, destroyed the colour of them as if it had been *aqua fortis*. Some of it flew into my face, and I felt continual shootings there for several hours, though I immediately washed the part.

THIS we may venture to assert, that the causes of a *cancer* may be either external or internal. Every blow or compression on the glands may cause an obstruction, and this obstruction may give rise to a *cancer*. The tumor, which, as yet, is only schirrous, and which perhaps will always continue so if not tampered with, may degenerate into a *cancer* by the injudicious application of a caustic, which only serves to irritate instead of destroying it entirely. This has frequently happened when caustics have been applied to the small schirrous tumors which come in the face and are lodged only in the skin. The same effect may be produced by the use of such cataplasms or plasters as are capable of heating the part, and thereby exciting motion in the obstructed fluids; and this we often see happen to women who have received a blow upon the breast. To these causes, which are merely external, we may add others arising from a disorder in the animal œconomy. The most usual cause of

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cancers is internal, and may be accounted for, as was before observed, from the structure of the glands and the disposition of the fluids to become vitiated. Thus women having a large number of glands in the breast and *uterus*, which secrete fluids that are very subject to become acrid, are consequently more liable to *cancers* than men. The influence that their *menfes* have upon these glands, which swell during their courses, contributes to their being very easily obstructed when any thing either suppresses those evacuations before their time, or when they entirely cease according to the course of nature.

WE likewise find that the vitiated humours which occasion head-achs, rheumatisms, or habitual and periodical evacuations, sometimes change their course from causes unknown, and passing to the glands, produce an obstruction in them. All these obstructions form at first no more than schirrous swellings; but they may afterwards degenerate, as I observed before, into *carcinomas*.

SIGNS. The signs that indicate a *schirrus*, or a *schirrus* become carcinomatous, as also those which serve to distinguish an ulcerated *cancer* from any other ulcer, are very different.

THE *schirrus* forms a tumor more or less large and indolent: in its beginning it is round and often moveable, so that by laying a finger upon it, we may change its situation. In its progress it generally becomes less round and less moveable by adhering to the adjacent parts. As long as this swelling continues only schirrous, there is no alteration of colour in the skin that covers it, even though it encreases very considerably; but when the *schirrus* becomes car-

carcinomatous, it grows more or less painful according to the kind and degree of alteration in the fluids that ferment there. This pain is sometimes dull, sometimes attended with a pulsation or throbbing, and sometimes with shootings or prickings like the wounds of a dart or needle. In some these pains are felt only at particular times, in others they are almost continual. The swelling generally loses its round figure, and appears more or less irregular, according as the neighbouring parts become obstructed, or, by adhering to it, encrease its bulk. The veins about the tumor are varicous, and easily discerned through the skin; and upon this account the ancients have given the name of *cancer* to these kind of tumors, as the veins seem to resemble the claws of a crab. The obstruction of these external vessels proceeds from that of the vessels within the tumor.

AGAIN, though the tumor ulcerates, it does not subside, but the pains increase and become continual. In the part where the pain is most acute, there appears at first a redness, and eschars or sloughs are afterwards insensibly formed there, proceeding from the gangrene or destruction of part of the tumor; the natural effect of the total obstruction joined to the disposition that the fluids are then in. These sloughs extend farther and farther as well upon the surface as in the middle of the swelling; and as all the vessels of the part are varicous, hæmorrhages break out from time to time, according as any of the vessels are destroyed by the spreading of the gangrene. This sordid ulcer continually increases, in opposition to every means that can be tried to prevent its progress; nor will it admit of being deterged, and

an ulcer with a putrid bottom can never generate good flesh.

FROM the preceding signs it is no difficult matter to distinguish a *cancer*, even that which affects the skin of the face, and is termed by the antients a *Noli me tangere*; but to what has been already said of the *cancer* in general, I shall subjoin several circumstances that relate to particular *cancers*, which depend upon the parts affected, and can be learnt only from experience.

CANCERS which come on the face generally attack one of the lips, though sometimes they affect the nose and eye-lids. This kind of *cancer*, when it ulcerates, is always attended with an hardness, which hardness extends in proportion as that which formed the first tumor is destroyed by erosion, and is always preceded by a change in the colour of the skin, which, before it indurates, turns red. This appearance of redness deserves particular notice, as will be hereafter shewn in the cure. See my *Observations*, page 42.

BOTH sexes may be affected with *cancers* in the breast, but it happens much more commonly to women, as their breasts are of a more glandular texture, being designed for the secretion of the milk that is to nourish the child.

Of all the *cancers* that are formed in that part, it is very seldom we find two that are perfectly alike; but the differences between them are of great importance to be known, in regard to the method of treating them. Some begin by a single point, which is certainly no more than one gland obstructed. It is very difficult to distinguish this under the finger, and, if quite free from pain, it is merely by chance that the patient discovers it: but when it becomes large, its bulk renders
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it easily distinguishable. If it is situated superficially, it is moveable; if deeply lodged, it is not so easily moved. This gland, though as yet but merely a *schirrus*, may be painful from the very beginning, without having acquired any carcinomatous disposition; and this may happen from several causes. The pain may be occasioned by a slight inflammation affecting the gland only; or it may arise from too great an extension of the fibres that compose the obstructed gland; or lastly, the pressure of the tumor upon some nervous part may produce this symptom. But if the pain arises from the corruption of the obstructed fluids, which are degenerated and become acrid, the gland is then carcinomatous, as will soon afterwards appear by an increase of the disorder.

WE sometimes find very considerable obstructions in womens breasts, which obstructions have been formed by degrees, and (as they were free from pain) without their being sensible of them, the preternatural size of the breast giving the first occasion to take notice of them. This is most frequently seen in very fat women after their *menfes* have left them, and is generally the beginning of a *cancer*, which increases pretty fast, as soon as it grows painful. Though this obstruction renders the breast much larger than is natural, yet the nipple appears sunk inwards.

It sometimes happens that the *cancer* attacks the breast only; sometimes the whole adipose substance lying behind the tendon of the *pectoralis major* becomes affected, growing unusually compact and hard in its texture, and after being extirpated by an operation, has been found full of schirrous glands. At other times the whole arm-

294 OF THE CANCER.

pit is filled with schirrous glands, which in time turn cancerous.

SOMETIMES the cancerous tumor is entirely separate from the fleshy part of the pectoral muscle, at other times adheres to it, and extends itself between the interstices of the fleshy fibres: I have seen some which reached to the cellular substance that connects that muscle to the intercostals, and in these cases a considerable part of the muscle was included in the tumor. If the swelling is free from any attachment to the pectoral muscle, it is moveable in whatever situation the arm is put; if it adheres, it seems also to be moveable and separated from the muscle when the arm is brought forwards, because the fibres of the muscle follow the motion that is given to the tumor; but if the arm is kept fixed behind, the adhesion of the tumor to the fleshy fibres is then manifest by its being immoveable. It is an essential rule therefore to place the patient's arm in a proper position when we examine the tumor.

SOME *cancers* encrease very fast, others so slowly, that for many years the patients suffer hardly any inconvenience from them. This depends upon the disposition of the obstructed fluids.

It is not an uncommon thing, when the breast is disordered, to have a discharge for several months, of a *sanies* or purulent *serum* from the nipple, or through the skin surrounding the nipple; which discharge however does not abate the disease of the breast, though, when it entirely ceases, the other augments much faster.

WE sometimes see instances of *cancers* where the humour consumes and destroys almost the whole breast in a few months; others where its
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progress is so slow that patients frequently bear them to a very old age without any considerable inconvenience. The first are very painful, the latter scarce at all.

CANCERS of the womb begin, like others, by an obstruction, and may seize either on the neck or body of it: they may also affect either its internal or external parts, that is, they may arise either in its cavity, or in the cellular substance that invests it, producing schirrous indurations in the *pelvis*. Women who have been accustomed to a large discharge by their *menfes*, are more liable to *cancers* in this part than in any other, and the disease commonly begins when that discharge either is going off, or entirely disappears. It is generally preceded either by a *fluor albus* or a flooding; and is discovered by wandering pains in the *pelvis* and in the *uterus*. Sometimes the schirrous tumors that are formed in the neck, or in the cavity of the womb, ulcerate, which is discoverable by a successive discharge of a sanious, sharp, or bloody matter, and sometimes by the coming away of fungous flesh or sloughs, which separate and pass out through the *vagina*. If the schirrous indurations do not ulcerate, the discharge in that case is not bloody, but frequently serous and acrimonious. In the mean time the pain continues, and upon introducing a finger into the *vagina*, you may distinguish the neck of the womb to be preternaturally large and hard.

THE indurations continue to increase, and when they become considerable, the *labia* swell and are frequently oedematous; and if the inguina glands are obstructed, as sometimes happens, the *oedema* soon extends to the thighs and legs. The

carcinomatous indurations, which are situated in the *pelvis*, seldom ulcerate; but they may imposthume, or have encysted dropsies formed upon them. See the chapter *Of the Dropsy*.

To conclude, *cancers* may arise in various parts of the body, and may be discovered by the preceding account of their different appearances.

PROGNOSTIC. A *schirrus* produced by a blow or compression may, if it is free from pain, be cured by extirpation, and even if it become carcinomatous, may be cured by the same means; though there is this difference between them, that in the latter case the disease may return; which can be imputed to no other cause, than that some of the humour which was in the diseased gland, having passed thence into the course of the circulation, has impregnated the lymph with the same taint.

A SCHIRRUS produced by the suppression of some habitual evacuation, is incurable, unless that evacuation can be supplied by some other, or be brought to return again. Such, for instance, are those *cancers* which sometimes arise in women, when either their courses are irregular, or are entirely stopt according to the course of nature. How many do we see, who at this turn of nature begin to have obstructions in their breasts, which become schirrous, and give rise to *cancers*? In some women, the glands of the *uterus* are obstructed; in others, the *ovaria*; and, in general, all these cases end fatally; for which reason we can give but a very bad prognostic of these obstructions, even though they are slowly formed, and for many years free from pain.

As to those schirrous tumors, that are formed either by a slow or hasty deposition of a morbid humour,

humour, which before affected the constitution under the various symptoms of head-achs, defluxions, rheumatic pains, sweats, &c. they may be removed by extirpation ; but unless we are fortunate enough to correct the indisposition of the juices that produced them, the disease will almost certainly return, especially if it be of the carcinomatous kind.

WHATEVER parts are affected, either with schirrous or carcinomatous tumors, if they can be entirely extirpated, we may in general say, they are curable ; but if they are so situated as not to admit the use of the knife, they are incurable by any other means. Such, for instance, are those tumors in the breast, where, at the same time, the glands of the *axilla* are swelled ; or if the tumor strongly adheres to the pectoral muscle ; sometimes also those which come upon the eyelids, or within the mouth ; or, lastly, such as either affect the *uterus*, or arise in one of the great cavities. Our prognostic must likewise be regulated according to the different alterations that happen in these tumors. Whilst they continue free from pain, we cannot call them *cancers*, and if they do not grow bigger, they are inconveniences that may be easily sustained without injuring the constitution. But the case is very different, if they daily increase in size.

IF, after a certain time, these swellings become painful, the *cancer* then commences, and in a short time probably the glands of the arm-pit are obstructed ; in which case, I have known fresh *cancers* to arise in different parts, even after the extirpation of that which appeared at first. In this case also, the bones may break by being affected with the same cancerous humour.

CANCERS that are very painful, and increase very fast, may be looked upon as incurable.

LASTLY, we may reckon as such every *cancer* that is ulcerated. I do not deny that such a case may be cured by an operation; but this I can positively affirm from many instances, that supposing the patient recovers, the disease will return again, sooner or later, either in the same part or some other. There may perhaps be some exceptions to what is here advanced, but they are so uncommon as not to invalidate what has been confirmed by numberless experiments.

CURE. In order to lay down any certain rules for treating a *cancer*, we must consider it in its rise, progress, and height.

I HAVE before observed that a *schirrus* is at first only an obstructed gland, which in time may become schirrous, then carcinomatous, and afterwards an ulcerated *cancer*. It is in its first state only, that it admits of a cure by the assistance of diet and medicines.

THE surgeon's earliest care should be to make an enquiry into the origin of this obstruction. If it proceeds from an external cause, and is recent, as from a blow, and if the pain immediately felt from thence either continues or increases, there is certainly some disorder in the part injured that may produce an inflammation; in which case we must endeavour to abate this symptom by a proper regimen and plentiful bleeding, with the application of emollient cataplasms to the part affected.

BUT tho' the pain and inflammation be removed, it is possible one or more of the glands may remain obstructed, and be so much swelled as to be distinguishable by the touch. This we often find
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happen to women who have received a blow upon their breast.

It is possible likewise that this gland, which continues diseased, though free from pain, may be so small as not to be distinguishable by the touch; the patient therefore imagines herself cured: but I have frequently known instances where the gland, though it continued free from pain, has gradually increased, and in a few months been so swelled as to be perceptible under the finger. In this case, bleeding ought to be used in proportion to the fulness of the constitution, and in the arm or foot, as is judged necessary in regard to their *menfes*. Likewise bathing, and the use of mild dissolvents mixed with gentle purgatives, have often been successful in dispersing the swelling of these glands. To these remedies, some propose to add the use of vulnerary and resolvent cataplasms, in order to excite a motion in the obstructed fluids; but I have several times tried this method without success; on the other hand, I have found great benefit from the application of a swanskin constantly applied, which will always preserve a warmth in the part. Sometimes the tumor has been dispersed, at other times only the growth of the gland has been retarded, and the tumor remained indolent. If, after a time, we find no further enlargement of the gland, we should lay aside the use of medicines, as by continuing them they would be liable to impair the constitution.

WHEN a *scirrhus* is once arrived to a certain degree of size and hardness, we have no medicines sufficiently powerful to dissolve it. If the patient is only incommoded by its weight, it may be left to itself. But if it increases, surgery affords no other

other remedy but extirpation, and where that is practicable, we may be assured of success. I would also propose it where the *schirrus* becomes painful, since the *cancer* is then but beginning, and provided the operation is not delayed, we may hope for a perfect cure. Nay, we may proceed to the extirpation even when the *schirrus* becomes a confirmed *cancer*, when painful, and broke; though I must freely own we can hardly hope for success from it. I do not deny that the wound may be healed, but the disease will almost certainly return; and the discredit this will bring upon the operation, may discourage and hinder many patients from venturing upon it, though the circumstances of their cases give no room to apprehend a relapse. Nevertheless, as there is absolutely no other remedy, and extirpation, even if there should be a return of the disease, may prolong the patient's life, it might not be amiss to propose it; giving at the same time such a prognostic of the event, as may secure both the surgeon and his profession from reproach, if a return should ensue.

Of the operation for the cancer.

SUPPOSING a schirrous or cancerous tumor either in the upper or lower lip, we must cut it out and re-unite the two portions of the divided lip by future, in the same manner as will be directed in the hare-lip. See also my *Observations*. If it is in any other part, it must likewise be intirely eradicated by an operation, if its situation will admit of that safely. Suppose the schirrous tumor in the breast, affecting a gland of a greater or less size, moveable within the adipose substance, and
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not adherent to the pectoral muscle, we may be well assured that there is no other diseased gland in the neighbouring fat, if the adipose substance is not harder than the rest of the breast; and in such a case we are only to extirpate the single gland that is schirrous, without any injury to the other part of the breast; and this may be done in the following manner:

THE patient having been prepared by bleeding, purging, and a proper regimen, for some days, she is to be seated in a chair, and her hands held fast by two assistants. Then with a longitudinal incision of a sufficient length, I divide the skin and fat to the gland. The gland being thus laid bare, I fix it with a double errhine or hook, which I give into the hand of an assistant; I then with my fingers disengage the gland as much as possible from the fat lying about it; and what could not be separated by that means, must be taken off afterwards by the knife, and with it any part of the fat that may be suspected to have suffered by being contiguous to the tumor.

THERE is seldom any hæmorrhage that requires us to use a ligature, so that it is generally sufficient to dress the wound with dry lint supported with compresses, and a bandage round the body, applied so moderately tight as not to hurt the breasts by compression. After some hours it would be proper to take off the compresses, and soften the lint with *ol. hip.* for having lain in the coagulated blood and become dry, its hardness might be liable to hurt the breast, and occasion a longer continuance of the pain, or perhaps bring on an inflammation.

THE first dressing should remain on three or four days, at the end of which time they are so moistened by the discharge as either to fall off of themselves, or be removed without pain. The wound is then to be looked upon as a simple wound, and dressed according to its different appearances.

WHEN the obstruction extends throughout the breast, the whole must be taken off. The patient being prepared, and placed in the manner as before directed, the arm on the side affected must be kept at some distance from the body, that the pectoral muscle may be a little extended. If the swelling is large, an assistant should support it and keep it steady with his hands; but if no hold can be taken of it by this means, the operator fixes it with the *Helvetian* forceps, which he gives to an assistant to hold. He then takes a long *bistory*, or for want of that, a razor fixed in its handle, and makes an incision into the sound part of the skin and fat above the tumor. This incision should be three or four inches long, and carried as deep as the pectoral muscle. Immediately he introduces three or four fingers, and passes them between that muscle and the distempered breast, which he may do very easily, as they separate without any trouble; and thus there is nothing left to cut but the skin, which is done with the same *bistory*, by carrying the incision round the tumor. If any adipose substance has escaped the incision, which by its hardness seems obstructed, it must be fixed with an errhine or the fingers, and be extirpated with the knife or scissors; and to do this the more easily, the pectoral muscle must be relaxed by bringing the arm a little nearer the body.

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AFTER having extirpated this fat, we sometimes find an obstructed gland situated near the axillary vessels; which we must be careful not to leave behind, as it might give rise to a fresh *cancer*. We might extirpate this by incision, but not without danger of opening some vessel arising from the trunk of the *arteria axillaris*, and occasioning an hæmorrhage that would be very difficult to stop; and therefore, to extirpate it more safely, the operator fixes it with an erethine that is to be held by an assistant, whilst he makes a ligature with a double-waxed thread behind the gland, which he ties with the fat that involves it.

If any considerable vessel should bleed during the performance of the operation, an assistant lays his finger upon it till the operation is over, and the blood, which springs out sometimes from several arteries, is then to be stopt. The patient frequently faints, and the hæmorrhage stops by that means: in which case she must be laid in a supine posture till she comes to herself; and if the bleeding returns, it must be suppressed either by making a ligature upon the vessel, or by the application of a small pledget dipt in styptic water.

THE wound is afterwards to be dressed with dry lint supported by compresses and a proper bandage, applied loosely. A large roller passing several times round the body would be improper, as the pain already obstructs respiration, and such a bandage, with any degree of tightness, would obstruct it much more. Besides, it sometimes happens that after some hours the wound bleeds, and it would be troublesome to remove this bandage; it is better therefore to keep on the dressings by passing a napkin round the body and fastening it with pins. The appearance of blood

304 OF THE CANCER.

on the linen, which often happens soon after the operation, may oblige us to take off the dressings in order to stop a fresh hæmorrhage; and it may be done without difficulty by the application of a pledget of lint dipt in styptic water.

AFTER some hours the dressings begin to be moistened with a reddish discharge, but must be left on till they are sufficiently softened to admit a change of the compresses, without moving the lint that sticks to the wound.

THE first dressing should remain on for four or five days; and in order to remove them without giving pain, the lint should be covered on the third day with linen rags dipt in melted lard. This soaks sufficiently into the lint to make it come off easily, and serves instead of other dressings till it all loosens and separates together. The sore is then to be looked upon only as a simple wound, and to be treated as such till it is healed.

WHERE the operation has been performed after the tumor began to grow carcinomatous, it has been often known to return, either at the middle or edges of the wound, when the discharge lessened. I have made use of strong caustics in these cases, but to no purpose; for before the eschar that was formed by the caustic had fallen off, it had produced more callosity than we had destroyed. Sometimes these fresh swellings have been extirpated by incision, but others have appeared; and the same thing I have known to happen after the operation, when the cancerous tumor adhered to the pectoral muscle. If you cured the patient, the disease returned in about a twelvemonth. Amongst the many instances I could bring to prove this, I shall give the following one; which may be relied upon.

A LADY of fifty years of age had a cancer in her left breast that began to ulcerate: she had been afflicted with it eight years, and it was grown so large as to weigh, when separated from the body, between seven and eight pounds. It was of a deep red colour, hard, and attended with some pain. A gangrene seized it, and in two days it separated and fell intirely off. The hæmorrhage was so great as to wet through the patient's bed, and run upon the floor. This happened in the night, and the next morning, when I was sent for, I found a wound that appeared black, almost round, and about nine inches in diameter. The hæmorrhage was stopped, but the patient was so weak, that it was necessary to think rather of reviving her than having recourse to any evacuations. I dressed the wound, and in four or five days it digested kindly, and had a very good appearance. I continued to dress her five weeks, in which time the edges of the wound began to draw in, new flesh granulated, and the sore seemed ready to cicatrize entirely, being at most not above an inch in diameter. The whole habit appeared to be in a good condition, and nature of herself seemed to have effected all that could have been done by art; but the scene soon changed, for in the middle of the wound there arose a small hard tumor, which gradually increasing, extended to the cicatrix; and in less than a month the tumor appeared again almost in the same state as it was in before the gangrene. About seven or eight months afterwards the patient died.

It is certain that nature had, by the gangrene, done all that art could have effected by an operation, and the hæmorrhage had unloaded all the vessels about the tumor, of which the good con-

dition of the wound for five weeks was a convincing proof: yet fresh cancerous swellings appeared in the middle of the wound when it seemed just ready to cicatrize; and as the local disorder could not be regarded as the cause, we must attribute this relapse to the morbid disposition of the fluids in general. In these cases, therefore, we can only propose such a regimen as may correct and soften the vitiated fluids, and prevent them, if possible, from becoming acrid, as they generally do while they are confined in the tumor. It will be unnecessary for me to give particular directions about this regimen, as that belongs to the physician's province.

Of disorders of the breast requiring an operation.

EVERY preternatural collection of a fluid in the breast has been ranked by authors under the general name of *empyema*. But as this fluid may be either diffused upon the diaphragm, or contained in a *cystis*, so as not to press upon that muscle, I think the term *empyema* should be applied only to the first of these cases.

Of the Empyema.

THE *empyema*, then, is a collection of a fluid in the breast, which presses on one side of the diaphragm. If there is a collection on both sides, there are two *empyemas*. This disorder may proceed either from an internal cause arising from some previous disease; or an external cause occasioned by a wound: according, therefore, to the different causes which produce the *empyema*, the extravasated fluid may be water, chyle, aliment, blood, or *pus*.

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OF THE BREAST. 307

A COLLECTION of water may be the effect of a colliquative disposition of the blood, and if so, may accompany the *ascites* or *anasarca*; but it more frequently proceeds from diseases of the lungs, and especially those which are not attended with an inflammation.

THE collection of blood may proceed from the rupture of some vessel in the breast; but this seldom happens unless from an *aneurism*, which, by being too much distended, bursts, and forms what is called a false *aneurism*. It may, and indeed most frequently does, proceed from a wound that has penetrated the breast. There never is an *empyema* of the aliment or chyle, unless from a wound received in the *thorax* which penetrates either the *oesophagus* or the *ductus thoracicus*.

THE *empyema* of *pūs* may proceed from a penetrating wound of the breast, the opening of which is either too small or improperly situated, so as not to allow of a free discharge to the matter. It may be owing likewise to an inflammation in the external membrane of the lungs, or of the *pleura*. These inflammations, we know, terminate by resolution, gangrene, or suppuration: if they can be resolved, the patient recovers; if a gangrene ensues, he dies; and, if they terminate in a suppuration, there is a formation of *pūs*. When the inflammation does not occasion an adhesion of the lungs to the *pleura*, the *pūs* is diffused upon the diaphragm; if it has produced an adhesion, the *pūs* is contained in a *cystis*; and by neglecting to discharge the matter, it breaks thro' the adhesion, falls upon the diaphragm, and then forms an *empyema*. I have known instances, even of abscesses in the liver, where the matter has penetrated the diaphragm and lodged itself in the breast; which

could not have happened unless the liver and diaphragm had become adherent to each other from an inflammation preceding the formation of the *pus*.

SIGNS. There are signs which discover a collection of a fluid upon the diaphragm, and others which indicate what kind of fluid it is. In the first class are the following, *viz.* a shortness of breath from the fluid filling part of the breast, and thereby preventing a free dilatation of the lungs. Secondly, expiration is more difficult than inspiration, because the diaphragm in the first of these actions is obliged to raise up the weight of the fluid that lies upon it, whereas that weight renders inspiration more easy. Thirdly, the patient, when he moves, sometimes perceives a fluctuation. Fourthly, if a collection be on one side only, and considerable, the breast is larger on that side than on the other, which proceeds from the ribs losing somewhat of their motion at every expiration, and being less depressed from the difficulty there is of performing that action. See my *Observations*, page 108. If the collection be on one side only, the patient is unable to lie on the other, unless the lungs adhere entirely to the *mediastinum* on the side where the collection is formed, which is a circumstance not easily to be discovered. See my *Observations*, p. 108. We may be assured then that the existence of this sign proves there is a collection formed there, though the want of it is not an absolute argument of the contrary. As to the signs which indicate the kind of fluid that is extravasated, they are to be collected from the nature of the disorder that produced the *empyema*, and from the preceding and concomitant symptoms.

If the signs which demonstrate the collection of any fluid succeed diseases occasioned by a colliquation of the blood, or if they happen after those distempers wherein the lungs have been long affected, there is reason to judge it a collection of water; and it is generally attended with an inflation of the neck and face, and an œdematous swelling of the extremities.

If the signs of such a collection arise subsequent to the patient's receiving a wound in the breast, and he is subject to frequent faintings, there is certainly an extravasation of blood.

If there has been an inflammatory disorder in the lungs or *pleura*, attended with symptoms of suppuration in some part of the breast, as a fixed and violent pain, irregular shiverings, a violent cough, an acute fever, with an œdematous swelling at the place where the pain is felt, and the signs of a collection appear afterwards, we may venture to pronounce that the *empyema* is formed of *pus*. Thick, clammy sweats also constantly attend this case.

PROGNOSTIC. Our prognostic must be taken from the place where the collection is formed, the cause that produced, and the symptoms which attend it.

EVERY collection lodged in the cavity of the breast may be considered as incurable, unless some means can be found to discharge the fluid that forms it.

A COLLECTION of water, proceeding from the colliquation of the blood, is incurable unless the *crasis* of the fluids can be restored; and I doubt very much whether the patient could then be cured, by letting out the water, as the lungs in such a case will be considerably wasted on that

side where the collection was seated. I have found them upon dissection not larger than a golden rennet. The discharging of the water may indeed be a relief to the patient for some days, but this he will be soon deprived of by a fresh collection. When it proceeds from diseased lungs, it will certainly prove mortal though the water should be discharged, for the lungs will be found full of scirrhous tubercles.

A COLLECTION of blood caused by a penetrating wound in the breast may be cured, if the bleeding vessel furnishes no fresh supplies.

THE *empyema* of *pus* arising from an abscess of the liver, is seldom curable, as the part from whence the *pus* arises is situated lower than any opening that can be made to discharge it, and consequently is very difficult, if not impossible, to be healed from the bottom.

THAT which proceeds from a suppuration in the breast may be cured by an operation, if the lungs do not adhere to the *pleura*; but if they do, and if the *pus*, which was inclosed in a *cystis*, happens to be diffused upon the diaphragm, there is very little to be done in such a case.

If there is an *empyema* on each side of the breast, the misfortune is so much the greater, as there are two disorders instead of one, which make it necessary to perform two operations. To conclude, this disease may be complicated with such a multiplicity of symptoms, as to allow but a very indifferent prognostic.

CURE. The *empyema* may be cured by nature and by art, that is, each of these may happen to effect a cure. The *empyema* of water is what is supposed curable by the efforts of nature, not that species of it which proceeds from a disease of the lungs,

lungs, but that which arises from the colligation of the fluids. The water has sometimes returned into the circulation, and passed off by urine, as we have before observed in treating of the *ascites*; but instances of this kind are very uncommon. As to the empyemas, of blood, *pus*, or chyle, the only method of removing them is by the surgical operation which takes its name from the disease. The assistance of a proper diet ought likewise to be made use of, either to correct the present symptoms or to prevent such as may ensue the operation.

THE operation consists in making an opening into the breast, sufficient to give passage to what is diffused upon the diaphragm, and to admit of conveying proper remedies. The necessary preparations being made, the patient must be placed in a convenient posture both for himself and the surgeon. The most convenient for the patient, who, from the nature of his disorder, is subject to a great difficulty of breathing, is to be seated on the side of his bed, with his legs hanging down, and his feet resting upon something firm. If he was to sit up in bed, he could not long continue in that posture, as his difficulty of breathing would be increased in such a situation.

THE opening in the *empyema*, as well as in common abscesses, must be made as near as possible to the most depending part; and it is for this reason that they advise the making it between the third and fourth of the false ribs, reckoning from below upwards, and about five fingers breadth from the *spina dorsæ*. This is termed the place of election. Authors speak likewise of a place of necessity for the operation, which they describe to be at the part

where the *pus* may be felt under the skin; but as the matter in such cases is not diffused upon the diaphragm, I do not call this disease an *empyema*, but an abscess in the breast; of which I propose to treat separately, and therefore do not admit of any place of necessity in the *empyema*.

HAVING determined upon the place, I make an incision about three inches long with a straight bistory, which incision will cut the line of direction of the ribs transversely; and with one or more strokes of the knife I divide the skin, the fat, and the muscles which cover the ribs, so that the fibres of the *latissimus dorsi* will be cut obliquely. If the patient is very fat, we may change this incision into a crucial one by dividing the two lips transversely, that is, according to the direction of the ribs. I afterwards lay my fore-finger along the back of the bistory, guarding the point of it with my finger, and I cut along the intercostal muscles and the *pleura* in the interstice of the ribs. If the fore-finger which lies on the back of the bistory touches the edges of the two ribs at the same time, the incision will be exactly between both, and there will be no danger of dividing the intercostal artery which runs along the inferior edge of the upper rib. It is necessary to make the opening in the *pleura* near half an inch long, or we might be liable either to distend it, and thereby produce an inflammation, or even to separate it from the ribs by introducing the finger, tent or seton with the dressings.

THE incision being made, we are to facilitate the discharge of the extravasated fluid, either by properly inclining the patient's body, or by introducing a probe into the cavity of the breast in order to remove the lungs from the ribs; and this

this ought to be done very expeditiously. If the matter that is to be discharged is of a thick consistence, as coagulated blood, it is proposed to dilute it by means of injections passed through the female *catheter*. But besides that this would be very difficult to do, it would require a considerable deal of time, and would also oblige us to leave that side of the breast too long open; which might be productive of very bad consequences. See my *Reflexions on Gun-shot wounds*.

It may be asked perhaps, whether it is proper to let out all the extravasated fluid at once? If there is a large quantity, which there generally is in most empyemas of *pus*, only part of it should be discharged at the time of the operation; as well to prevent the patient's fainting, as because the actions of the lungs on that side are suspended whilst the wound remains open. The patient therefore should be dressed as soon as possible, since we may be assured that what is left behind will afterwards gradually come away in the dressings. As the discharge is made thus by degrees, the patient will not be liable to be weakened by it; and in proportion as it passes out, the dilatation of the lungs will be more free, and respiration less obstructed.

PRACTITIONERS are not agreed about the dressings upon this occasion: some are for putting a linen tent into the opening, made flat, so as to be adapted to the figure of the wound, and blunt at the end, taking care likewise that it may not slip into the cavity of the *thorax*.

OTHERS advise a seton, one end of which is to be introduced through the wound into the cavity of the breast, while the other end remains without. There are some again who cover the orifice with

with a fine rag about half a foot square, upon which they lay a pellet of lint that presses against the wound, and keep on the whole with thick compresses and a bandage round the body.

ALL these methods have their inconveniences. The tent, if it is made too thick, not only fills up the opening made in the breast so as to prevent any discharge, but likewise distends the intercostal muscles and *pleura*; and yet it would be preferable either to the seton or pellet in an *empyema* of blood, if the vessel from whence the blood flowed continued to furnish fresh supplies: The reason of this is plain. The only means of stopping the hæmorrhage must be by the coagulated blood forming a clot about the mouth of the opened vessel, which clot extends itself and passes even into the vessel, and as long as it remains there the bleeding ceases. During this interval, the blood flows through the collateral vessels; and the orifice of the divided vessel, contracting itself, incloses that portion of the clot which was formed between its lips, and the clot is by degrees divided into two; one part of which remains in the vessel and stops the orifice, whilst the other falls off by supuration. It is necessary therefore that a tent should be placed in the opening between the ribs, to confine part of the extravasated blood within the breast, otherwise the clot not being supported would fall off before the mouth of the vessel was closed, and the blood would issue afresh. This tent should be flat, soft, and of such a size as to fill up the interstice of the ribs without suffering a compression. As to the seton, one end of which is designed to be in the cavity of the breast; it would be an useless, extraneous body, and might prove very prejudicial. The applica-
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tion of a pellet would not be attended with pain, but would suffer the breast to be emptied too suddenly, and the wound to re-unite too fast, so that the muscular fibres of the *latissimus dorsi* would in some measure close it up, which might render the dressings painful, and sometimes very difficult to be applied.

UPON the whole then, there is no general rule to be given in this case; but the tent and pellet are to be used occasionally, according as circumstances vary. At the first dressing, indeed, I think, the tent ought always to be used, taking care to make it very flat, since it would otherwise (especially as it swells and grows larger by imbibing the discharge) obstruct the motion of the ribs. By this method we have a greater command of the opening; and therefore I would advise it to be made use of as long as the discharge continues, or whilst injections are necessary, which ought to be quite avoided, unless there are very urgent reasons for their use. When the disease is so far removed as only to want the healing up of the wound, the tent would then be as an extraneous body, and the pellet is preferable.

As the *empyema* of *pus* proceeds from a suppuration formed in the same side of the breast, we must not wonder to find a certain quantity of matter in the breast at every dressing, though a great deal comes away; and the reason of this is, that since the operation, the matter ouzes from all the ulcerated parts, and will continue to do so in some degree till these are cicatrized.

THE *empyema* of *pus* is the only one where we can assist nature by the use of injections; and here it may be proper to make use of them to cleanse and deterge the internal ulcers, and to convey (at least

least for some time) such remedies as are judged necessary. But observe that these injections should be made very seldom, since upon every occasion of this kind the breast is kept open, which, as the lungs on that side are not dilated while the breast is thus exposed, may produce an obstruction there.

THE dressings are to be applied as soon as ever the injection is thrown in, which will gradually come away afterwards through the wound. If there is an *empyema* on each side of the breast, and the case not very urgent, we ought, for fear of exhausting the patient's strength, to perform the two operations at the distance of a day or two from each other.

If an *empyema* is formed on each side of the breast, great care must be taken not to leave the two wounds open at the same time, as it might endanger the patient's being suffocated. To prevent this, let an assistant, whilst the orifice of one side is open, press with his hand upon the dressing of the other side, that the air may not pass through the wound, and get in between the lungs and the *pleura*.

Of abscesses in the breast.

AFTER having treated of the *empyema* as a disease proceeding from a collection of *pus*, and pressing upon the diaphragm, I come now to speak of the abscesses formed in the breast between the lungs and the *pleura*; and which, if not timely opened, degenerates into an *empyema*. In doing this, I propose to begin with these abscesses from their rise, and to follow them in their several gradations to their cure; but previous to this, as the

knowledge of the natural state of the *pleura* may lead us to form a right judgment of its morbid condition, I shall remind the reader that this membrane lines the whole cavity of the breast, and is attached to its internal surface by a cellular substance: that it likewise forms the *mediastinum*, and furnishes the lungs with their external coat.

As the *membrana adiposa* is the general seat of a *pblegmon*, so the membranous and aponeurotic parts are particularly subject to an *erysipelas*. The *pleura*, therefore, like other membranes, is subject to an *erysipelas*, which may afterwards degenerate into a *pblegmon*, and produce pleurifies, peripneumonies, &c.

WE often find these diseases give way to a proper diet, the inflammation terminating by resolution; but the cure, though seemingly perfect, does not always prove so in reality. Experience teaches us, that inflammations often produce preternatural adhesions of one part to another when they come into contact, and that the lungs sometimes contract such adhesions with the *pleura*; adhering either to that part of the *pleura* which lines the ribs, or to that which lines the *diaphragm*, and sometimes to the *mediastinum*; in consequence of which, these patients, who otherwise seemed cured, have a slight pain, and especially when they cough, at that part of the breast where the inflammation was greatest: this pain is certainly the effect of these adhesions, and it must necessarily be increased by the force of coughing and a *plethora*. If the bodies of the dead were as superstitiously regarded in all countries as they are in some, where they are not suffered to be opened, we should have been ignorant of these adhesions, and of the state wherein these membranes remain after

after their seeming cures just mentioned. But we have happily shaken off these prejudices; and, by inspection into the bodies of the dead, we learn, that the membranes, when attacked with any considerable inflammation, continue red, hard, and of a preternatural thickness, unless the resolution be perfect. I have seen instances of this where the membranes have been near a quarter of an inch thick, which is very extraordinary, considering the natural fineness of the texture of these parts. We may reasonably say, therefore, in this case, that the disease has not terminated by resolution, but by induration; that is, the obstructed fluids are inspissated, and the vessels which contained them having lost their softness and flexibility, are also grown thick, and have acquired a degree of hardness almost equal to a callosity. And yet, though these membranes may be looked upon as diseased, there is a circulation of the fluids in them for their nourishment, which circulation is more or less free according to the degree of the induration. It is likewise observable, that though the external membrane of the lungs and the *pleura*, when obstructed and thickened thus, seem by their adhesion to make but one membrane, yet it is easy to distinguish them from one another, and to separate them by dissection. As there is not however that freedom in the circulation as is natural, there often happens an entire stoppage of the fluids in some particular part, which occasioning some of the obstructed vessels to burst, there necessarily ensues a suppuration.

THE abscesses here meant are sometimes formed in the cellular substance of the thickened *pleura*, but I have met with them oftener between the mem-

membranes that were become adherent. See my *Observations upon the diseases of the breast.*

THESE abscesses ought to be looked upon as real phlegmons; for the *pleura*, as I just now observed, having become red and thickened, and all the lymphatic vessels which moistened it before being now become sanguinary vessels, it cannot be reckoned as a membrane: besides, the symptoms which either precede or attend the formation of *pus* in these cases, are almost similar to those which accompany phlegmons formed in the *membrana adiposa*, except that the suppuration of phlegmons in the adipose substance is formed much quicker than the others; and the reason of this is very evident. In phlegmons that are formed in the adipose parts, the obstructed tubes remaining, as in their natural state, fine and thin, easily break, if distended in their diameters by the inflamed blood which is stopped there, and ferments; but here the tubes being grown hard and callous give a resistance to the circulating fluid, which likewise passes through them with more difficulty as it is become almost of the consistence of a jelly. If therefore a rupture happens in any of the obstructed vessels, it is made with greater difficulty, and after a longer time; and for this reason it is that those abscesses are a great while in forming, and frequently are not in a condition to be opened till above half a year after the disease began; whereas the other phlegmons begin to appear, come to suppuration, and are fit to be opened in a week, and sometimes sooner.

SIGNS. The symptoms that attend the formation of *pus* between the lungs and the *pleura* must serve as indications in this case; and, in order to furnish an exact account of these, it would be requisite to give instances of the several diseases that

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have terminated by such abscesses; but this may be seen in my *Chirurgical Observations*, together with the signs that characterize these abscesses, and enable us to distinguish them from the *empyema*. To avoid repetitions, therefore, I shall refer my reader to what I have therein mentioned.

PROGNOSTIC. This disease, which at its beginning fell under the physician's care and direction, is now changed, and become a chirurgical case. When the *pus* is once formed, many circumstances serve to direct our prognostic, if we can be properly informed of them; such as the extent of the adhesion, the part of it in which the matter is formed, the state of the patient in general, and of the lungs in particular. If the extent of the adhesion is small, of which we may judge by learning the place where the first pains were felt, and that whereof the patient now complains; and if at the same time the abscess is so situated that it can be opened, we may hope to effect a cure, provided the incision be made soon. But if the adhesion is in a part that is beyond the reach of chirurgical assistance, the abscess will either penetrate the lungs, and the quantity of *pus* will sooner or later kill the patient, or it will pass into the cavity of the breast; and being expanded upon the diaphragm, the patient will be in equal danger of his life, though we should perform the operation of the *empyema*.

If the adhesion is very extensive, the cure is doubtful, even if an opening be immediately made into the abscess, as there may be other abscesses within the extent of the adhesion, which are out of our reach.

SUPPOSING the adhesion is not very considerable, yet if the opening of these abscesses be delayed, the *pus* will gradually break through the adhe-

adhesion in some part or other, and diffusing itself upon the diaphragm will form an incurable *empyema*, even though the *pus* should be discharged by the operation. See my *Observations*, page 101.

THE bad state of the patient, worn out by a lingering distemper, may be another direction to determine our prognostic, but ought not to prevent our procuring a discharge of the *pus*, if there is an indication for it, and it be practicable.

LASTLY, it is very difficult to discover exactly what condition the lungs may be in. It is impossible they should not have been affected by the inflammation when the abscess was forming, and the symptoms that attended the formation of the *pus* may probably have very much injured them. We may judge in some measure of this by the respiration, according as it is free or obstructed, painful or otherwise; also by the bloody, purulent, frothy, or thick expectorations; by the cough, as it is more or less hard and troublesome, &c.; and by all these symptoms jointly considered.

CURE. It is impossible in these abscesses to feel the matter fluctuate under the finger; as the intercostal muscles, the ribs, the *membrana adiposa*, and the skin lie between, and it is very seldom that the matter ever wastes or destroys any of these; though I have seen two instances where this has happened. See my *Observations*. A serous fluid may indeed ouze from the abscess, and passing through the intercostal muscles may insinuate itself into the cells of the *membrana adiposa*; in which case we find a preternatural thickness in the teguments, which upon the least increase retains an impression of the finger. It is there the opening ought to be made, as that is the part where

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you will find the *pus*. It is true indeed this is not the place that is at present most painful, but it was so during the height of the inflammation which caused the adhesion, and ceased to be so only after the parts affected had come to suppuration.

THE same method must be used in opening this abscess as in performing the operation of the *empyema*. An incision must be made through the teguments and the muscles lying immediately under the skin, according to the line of direction of the body, and the intercostal muscles must be divided according to the direction of the ribs, with the same precautions as were before directed in performing the operation. There is no other difference but in the part where the incision is to be made, which we are directed to by the slight *adema* before taken notice of; and this is what authors, who have not distinguished an *empyema* from these abscesses, have termed the place of necessity.

THE manner of discharging the *pus* differs in this case from that of the *empyema*. We may let it all come away at once without being afraid of leaving the breast too long open, for the air being prevented by the adhesion from penetrating, as in the *empyema*, between the *pleura* and the lungs, they will be dilated on this side in inspiration. We may also use injections here, as we have no other means of conveying the proper remedies into the cavity of the abscess. There is one case only where the use of them would be improper, and that is when the patient has lately expectorated matter, since this shews that the *pus* has got into the lungs, and injections would be liable to bring on violent coughing. See my *Observations*,

vations, page 116. In the course of the dressings there is sometimes a larger discharge of pus than at others, nor need we be surpris'd at this. Several small abscesses having been formed at some distance from one another, and the matter contained in each abscess having contributed to separate the adhesion, they united and formed the abscess which we opened. If more matter comes away afterwards than is usual, it is undoubtedly owing to the contents of a new abscess, which has separated some other part of the adhesion, and opened itself into the first. The wound, in such cases, generally remains fistulous, the opening made by the last abscess not being proportionable to the largeness of its bottom, and it being impossible to throw in proper injections either to make it suppurate properly or to deterge it.

THERE is an account in my *Observations* of several disorders of this kind; some of which were cured, in others the patients died. In the cure of the former, and by the relation of the circumstances which occurred upon opening the bodies of the latter, you may meet with proofs of what I have advanced.

I HAVE been the more particular in explaining this subject, as I do not find any who have written before me have thoroughly considered it.

Of the QUINCY.

THE quincy is an inflammation of those parts of the throat that are subservient to respiration, speech, and deglutition: it may affect therefore that portion of the *trachea* which ex-

tends from the *larynx* to its first division, as also the *larynx* itself, the *pharynx*, the tonsils, the arch of the palate, the *uvula*, and the membranous and cellular substance that is situated between the adjacent muscles; so that the muscles are included amongst the number of the parts liable to this inflammation.

AUTHORS have divided the different species of quincies into true and false; comprehending in the first class those quincies that affect the *trachea*, the *larynx*, and *pharynx*; and in the latter, those which affect the tonsils, the arch of the palate, the *uvula*, and the muscles.

THIS inflammation is either lymphatic, erysipelatous, or phlegmonous, and therefore differs not from inflammations of any other parts; but it frequently produces symptoms of much more consequence, and which require the most speedy relief, as it interrupts, and may even quite obstruct, respiration and deglutition. If the arm, leg, and many other parts are inflamed, their actions may be suspended without much danger; but respiration and deglutition being necessary to life, relief must be more speedy in a quincy than is absolutely requisite in respect to most other inflammations.

WITHOUT either deviating too much from or exactly following the distinctions which authors have made of this disease, I shall proceed to examine what disorders they may produce in each of the parts affected; but previous to this I must observe, that it is almost impossible any one of these parts should be inflamed without some of the other suffering more or less at the same time. Anatomy teaches us, that the *larynx*, the *pharynx*, and the tongue, have a great number of muscles
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for the performance of their several functions; that these parts and their muscles are joined together by a membranous and cellular substance, which in several places is furnished with glands and fat. It is very natural therefore, that the one should participate of the disorders of the others; for being contiguous, and the muscles that conduce to their motion either being almost common to all, or acting conjointly, one of them cannot be moved without some other being in action at the same time.

The first kind of Quincy.

THERE is one sort of quincy, which, two or three days before death, attacks almost all persons whose strength has been exhausted by large evacuations: it is a sort of hoarseness, attended with some degree of pain when they speak or swallow, proceeding from a dryness of the internal coat of the *trachæa* and the *larynx*: but it is needless to enlarge upon this disease, as it is the sign of an approaching death.

The second kind of Quincy.

THIS species of quincy may probably prove slight, being only a simple obstruction in the glands that are situated between the membranes of the *trachæa* or the *larynx*, and is occasioned by having imbibed cold air in breathing; drinking too cold liquors, though they do not enter into the *larynx*, may likewise produce the same effect, by passing over the *epiglottis*. Cold stops the mouths

326 OF THE QUINCY.

of the excretory ducts of these glands, and the fluids which they secrete to keep the passage constantly moist, is thereby inspissated, and causes an uneasy dryness. From this dryness proceeds a hoarseness, and a slight pain, which in some measure obstructs deglutition. These symptoms continue for some days, till the obstructed fluid, dissolving by a kind of digestion, runs into the cavity of the *trachea* or the *larynx*, from whence it is spit up. In order to promote this digestion, which is the only means of curing the hoarseness, the patient should breathe a warm air, and sometimes inhale the steams of warm water, which serve as a fomentation to the internal part of the passage. A plentiful use of emollient and warm drinks may also be serviceable, and, what is very essential in this case, the patient should be enjoined a perfect silence.

The third sort of Quinsey.

If the internal membrane of the *trachea* or that of the *larynx* are inflamed, this inflammation, which is of the erysipelatous kind, causes a disease most violent in its nature and very rapid in its progress; and is usually indicated by the following symptoms.

SIGNS. This swelling being seated in the canal affords no external appearance, but the patient feels a burning heat with a very violent internal pain, which hinders his swallowing. This pain is greater in inspiration, because the passage is then dilated, and the patient cannot breathe easily unless when sitting. As the disease increases, respiration grows very short and difficult, the voice is shrill, and the fever extremely violent, accom-
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OF THE QUINCY. 327

panied with an ardent thirst. In short, all these symptoms increase so strongly and so speedily, that the inflammation may quickly terminate in a gangrene. The whole internal membrane of the upper part of the *trachea* has been known, in these cases, to separate, and, in a violent fit of coughing, come away in one piece; but instances are much more frequent of the patient's dying very suddenly, notwithstanding the utmost care has been taken.

The fourth kind of Quinzy.

THE inflammation may seize on the *larynx* and the *trachea* both externally and internally, and by a gradual increase extend to the cellular and adipose substance, lying between the muscles of the tongue, and those of the *os hyoides*; in which case the tumor that before was only erysipelatous now becomes phlegmonous. To the symptoms already mentioned, are added a swelling of the throat, and sometimes a redness appearing on the outside: the patient can hardly swallow his spittle, for the muscles of the tongue, being deprived of their action, cannot apply it to the palate. The tongue hangs partly out of the mouth, the eyes sparkle, and the face is bloated: in short, the organs of sight, hearing, smelling, and tasting, and even the brain itself, may be affected by a compression of the jugular veins, through which the blood passes with difficulty. But what most fatigues the patient, and alarms the by-standers, is the great difficulty of breathing, which hinders the blood from circulating freely in the lungs. This symptom increases visibly, and sometimes so fast as to require an operation, for the immediate relief of the

patient, though not otherwise relative to the cure of the inflammation.

CAUSES. The bad disposition of the fluids, overheated by spirituous liquors or food of an heating nature, may produce an inflammation in these parts as well as in others, exclusive of any external cause; though external causes indeed may determine the defluxion to this part; as they may likewise do even when the fluids are in a good state.

Of these causes the most usual is the passage of a cold moist air through the *larynx*. The nose is a sort of labyrinth, designed by nature to warm the air before it enters the lungs. But many people breathe only through the mouth, especially when they hollow, sing loud, perform any violent exercise, or when they walk or run very fast. At such times the air passes cold through the *trachea* into the lungs, and from thence often proceed hoarsenesses, violent rheums, peripneumonies, &c. the cold air in those parts shutting up all the pores through which the perspirable matter ought to pass, and inspissating the fluids secreted by the glands. The same cause that produces the inflammation in the lungs, may occasion it equally or rather sooner in the *larynx*, as this is the part first affected by the air at the time of inspiration. Drinking very cold liquors, as was before observed, and likewise blows, compressions, wounds, &c. may occasion the like inflammation.

The fifth kind of Quincy.

THE quincy that seizes upon the *pharynx*, and is confined to that only, does not occasion such

such bad symptoms as that of the *trachea* and the *larynx*.

SIGNS. In this case, though the patient breathes with ease, he swallows with difficulty, and sometimes not all; what he attempts to swallow either coming out at his nose, or falls partly into the entrance of the *larynx* (the free motion of the *epiglottis* being suspended) and occasions violent fits of coughing. The fever is proportionable to the degree of the inflammation, and the thirst to the difficulty of swallowing.

CAUSES. The internal causes of this disorder are the same with those of any other inflammation, and it may arise also merely from external causes. Little bones, or the splinters of broken ones, pins or needles got accidentally into our food, also fish-bones or other extraneous bodies, may happen to stick in the *pharynx* of those who do not sufficiently masticate their food, and may produce excoriations. Drinking very cooling liquors when we are hot, may close the pores there and bring on an obstruction of the glands, which are very numerous in that part, and stop the perspirable matter which before was constantly passing through in great quantity; very sharp liquors also may corrugate and irritate the coats of the passage. Thus we see that inflammations in these parts may be produced by various causes; and if the disorder spreads to the *trachea*, the *larynx*, the cellular substance, and the fat lying between the muscles of the tongue and those of the *os hyoides*, such other symptoms will appear as we have described in the quincy of those parts.

PROGNOSTIC. Our prognostic is not to be taken altogether from the nature of a disease, but also from the particular parts affected, and the pro-

progress that the disease either has already made or may hereafter make.

EVERY inflammation is dangerous, wherever situated, since it may increase in such a manner as to destroy the part affected, if not the patient's life. Every quincy therefore is dangerous, but that which is most so, is the quincy which seizes on the *trachea*, the *larynx*, or the neighbouring muscles; for in these cases, the inflammation may kill the patient, either by bringing on a great difficulty of breathing, or by entirely closing up the passage of the air before it rises to its height. Upon these occasions then, we can make but a very doubtful, or rather discouraging prognostic, and the more so, as the operation of *bronchotomy*, which is the only means we have left of removing this last symptom, is of no service in remedying the primary cause of the distemper.

THIS operation, by which we make an opening into the wind-pipe, is not in itself dangerous, as is evident by the cures which are often made on people who in a fit of madness have cut their throats, and sometimes half divided the *trachea*: it is not therefore the operation which endangers the patient's life, but the original inflammation, which may either terminate in a gangrene or spread to the lungs.

CURE. In these cases, we are not so much to consult the strength of the patient as the nature of the disease, in order to stop its progress.

THE plentiful use of cooling and emollient liquors, though they are indicated as useful, yet are only so in the beginning of the distemper: for when it increases, the patient is rendered unable to swallow, and consequently no regimen can be prescribed.

GAR-

OF THE QUINCY. 331

GARGARISMS too at first may take place, but not afterwards, the patient being unable to raise his head, for fear of suffocation. The only remedies we can have recourse to then, are clysters, bleeding, and cataplasms. The first of these ought to be plentifully administered, if the posture wherein the patient is obliged to remain, will permit. They must be cooling and gently laxative, in order to procure such revulsive evacuations as may unload the suffering parts. The vessels also must be emptied by copious and frequent bleeding, particularly in the foot, as being in this case more revulsive; and this indeed is the chief remedy.

CATAPLASMS, by the warmth they communicate to the part, may relax the inflammatory tension and forward the resolution of the obstructed fluids. Let the throat therefore be embrocated with resolvent oils; as oil of lilies, camomile, &c. and afterwards emollient cataplasms applied, and frequently renewed to prevent their growing cold.

DURING the use of these remedies, the surgeon should carefully observe how the patient breathes; and, if he sees reason to apprehend him in danger of being suffocated, he must immediately have recourse to the operation of *bronchotomy*, to give a free passage for the air into the *trachea*.

Of the operation of Bronchotomy.

To perform this operation, the patient must continue in the posture in which he breathes most easily; for bending back the head a little, as some authors advise, might possibly suffocate him. They propose likewise to divide the skin first, and then gradually separate the muscles that cover the

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the *larynx*. This appears well in speculation, but if the pain should excite the patient to cry out, the motions thereby occasioned might be of fatal consequence. The operation therefore should be done as expeditiously as possible. The neck being swelled and distended will make it easier than otherwise it would be, to divide the skin; but yet I should choose to have it secured from slipping by an assistant placing his hand on one side of the *trachea* whilst the operator does the same on the other; but this must be done without much pressure.

EVERY thing being ready, I make an incision in the skin according to the direction of the neck, beginning about half a finger's breadth above the inferior part of the cricoide cartilage, and continuing it according to the progress of the *trachea*, I finish it towards the fifth or sixth of the annular cartilages, varying sometimes in this respect according to the length of the patient's neck. This done, with a second and deeper cut, beginning a little below the *cartilago cricoides*, I lay bare the *trachea* sufficiently to distinguish with the finger the resistance of its cartilages. The air distending the *trachea* by the difficulty it meets with in passing, we may easily enter the point of the bistory sideways between the third and fourth ring, where we make a transverse incision about half an inch long. Immediately I introduce into the wound of the *trachea* a small *canula*, conveying it either upon a probe or by itself.

THIS *canula* is made of silver or lead, very flat, and also blunt at its extremity, and of such a length as not to reach the part of the *trachea* opposite to the incision. It is furnished with two ears, through which we pass a ribbon that goes round the neck and fixes it in the opening made

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in the *trachea*. I then cover the wound with gauze, the texture of which is loose enough to give passage to the air, and yet sufficiently close to stop any threads that might unravel from the linen that is put over it. Without this precaution they might be drawn with the air into the lungs, and excite a violent cough. This gauze is to be covered with a compress several times doubled, having an opening made in the middle of it, and wet with some warm liquor. The whole is to be kept on by a circular compress with an opening in it likewise answering to the orifice of the *canula*. The air passing freely through these apertures, the patient will breathe easily; and this relief may conduce very much to abate the inflammation and the other symptoms; for nothing causes greater disorders in the whole animal system, than a difficulty of breathing; besides the danger there is of the lungs by this means becoming obstructed. But yet, though the patient breathes freely, the inflammation, if it continues, requires the same care as was before directed. When it is considerably abated, which may be known by a remission of the fever, pain, and difficulty of swallowing, the *canula* must be taken out, and the wound left almost entirely to nature, dressing it only with a common plaster, kept on by a compress round the neck, and fastened moderately tight with pins. The incision in the *trachea* will soon close, and the cicatrix will cover it.

A sixth sort of Quinsey.

THE inflammation that affects the arch of the palate, the *uvula* and the tonsils, though confined to these parts, occasions almost the same symptoms

toms as an inflammation of the *pharynx*. If the patient can open his mouth, we may easily discover the *uvula*, which is very large; and elongated; the tonsils by their enlargement almost touch the *uvula*, and the whole fleshy arch appears swelled and very red. The air passes out with difficulty thro' the *larynx*, because the passages of the nose and mouth are very much obstructed by the swelling. The patient swallows with great difficulty, and what he attempts to get down returns again partly through the nose. The *saliva*, which he can neither swallow nor spit out, thickens in the throat, and becomes very troublesome by its quantity. The pain is continued to the ear, by reason of the inflammation of the *Ductus Eustachii*, which occasions either a deafness, or a very disagreeable noise.

If the inflammation spreads to the muscles of the tongue, the *os hyoides*, the *pharynx*, &c. this increase of the disease produces many of the symptoms before taken notice of. The throat swells, the tongue hangs out, the face becomes bloated, &c. and the fever rises in proportion to the degree of the inflammation.

CURE. This kind of quincy terminates either by resolution or suppuration, and that of the tonsils not unfrequently ends in a *schirrus*; but as dispersing it is the best method, we should endeavour as soon as possible to effect that.

WHILST the patient can swallow, the use of emollient draughts will be very serviceable; but when he cannot do this without a good deal of pain, he ought at least to moisten his mouth pretty often, in order to attenuate the *saliva*, which thickens and occasions frequent and troublesome attempts to hawk it up. Nor should we from the beginning of the disease be afraid of using the lancet,

lancet, for large and frequent evacuations by bleeding are the most likely means to stop the progress of the disease, and probably to produce a speedy cure. Cataplasms gently astringent may likewise be usefully applied round the neck. But if, in opposition to our endeavours, the inflammation still increases, bleeding and the same remedies must be continued, with this difference only, that instead of the restraining cataplasms we are to substitute such as are emollient and resolvent, by which means we often find the disease gives way and entirely goes off.

It sometimes happens that the tonsils remain large, hard, and in some measure schirrous. The hardness may be dispersed by the frequent use of gargarisms made with a decoction of emollient herbs, or with warm milk only; but as they generally continue rather larger than is natural, they may be afterwards subject to abscesses, which, unless they break of themselves (as they commonly do) should be opened.

This kind of quincy may terminate by suppuration two different ways, viz. either in an ulcer, or an abscess. If in an ulcer, it is formed either upon the tonsil itself, or on the sides of the fleshy arch. This indeed cannot be easily discerned till the symptoms are somewhat abated, when the patient is able to open his mouth. This ulcer is of greater or less extent, and the slough that covers it, is white, and more or less thick. We must endeavour to digest it off by frequently touching it with a mixture of syrup of mulberries, and a few drops of spirit of vitriol; and as the slough separates, the ulcer becomes red, deterges, and heals in a few days, being continually moistened by the *saliva*, which is of use in the cure.

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WHEN the quincy terminates in an abscess, it is generally formed in the cellular membrane of the tonsil, and seldom in the body or substance itself. As soon as the *pus* is formed, the fever abates a little; yet the patient finds but small relief from this, because of the swelling and the great difficulty of swallowing. Together with these he perceives a most offensive smell of *pus*, though the abscess is not yet open: but when this symptom arises, it is probable the abscess will soon break: When it does, he spits out the matter and is perfectly easy. But supposing the abscess does not break of itself, if we can see it, or feel it with the end of the finger, we may spare the patient some hours pain by introducing a lancet: and indeed we are sometimes obliged to do this on account of the violence of the disorder.

THE lancet which we use upon this occasion should be of a sufficient length, being fixed in its scale, and armed with linen wrapped round the blade, so that only about half an inch of the blade is left bare. The patient's tongue must be depressed with a spoon or a *spatula*, upon which we conduct the lancet, and pass the point of it into the abscess; but I think this incision may be made more conveniently with the instrument called *pharyngotomus*. When the abscess is opened, the throat should be often gargled with detergent and sub-astringent decoctions; for though these do not enter into the cavity of the abscess, yet by the motions they excite of the muscles of the tongue, of the *os hyoides*, and the *pharynx*, in gargling the throat, and spitting, they compress the abscess on every side, and squeeze out the matter. The same method may be continued for several days
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after the incision is made; for as the abscess could not be opened in its whole extent, some matter may still lodge there. To conclude, the cure of the abscess depends chiefly upon nature.

WHAT we call the tonsils are only a *congeries* of several conglomerate glands, united together by membranes. When these have been rendered schirrous, and afterwards have matter formed in them, the suppuration is performed with greater difficulty, and the symptoms are more violent; therefore, as soon as ever the matter is formed, the abscess should be opened.

Of the amputation of the uvula.

WE have seen, in speaking of the false quincy, that the *uvula* becomes inflamed as well as the fleshy arch of the palate, and that it is likewise enlarged and falls down. The frequent inflammations that happen in this part, though we succeed in removing them, occasion such a weakness of the *uvula*, that, being thereby rendered incapable to support itself, it falls down upon the *epiglottis* and seems as if it was elongated: nor is it improbable, from its whole texture becoming varicous, that it really is so.

By the *uvula* falling down thus upon the *epiglottis*, it becomes very troublesome to the patient, who is continually attempting either to swallow or to raise up what he feels in his throat; but in vain, for it falls down again, and the same sensation is renewed.

THE only way of removing this complaint is by cutting off part of the *uvula*. In order to this, having seated the patient in a chair placed in a good light, with his head held fast by an assistant,

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I direct

338 OF THE QUINCY.

I direct him to open his mouth, and pressing down the tongue with a pair of *forceps* of a sufficient length, I take hold of the extremity of the *uvula* with the *forceps*, and immediately with a long pair of *scissars* cut off at one snip more or less of it, according to its length. There have been instruments invented on purpose for this operation, which will likewise answer the design. The hæmorrhage is inconsiderable, and stops by gargling the mouth with cold water and swallowing it down; and all that the patient need to do afterwards is to gargle it for a few days with warm wine, and the wound will heal.

The manner of cutting the frænum of the tongue.

THE internal membrane of the mouth forms a kind of fold under the fore part of the tongue, to the middle of which it is connected, and makes what is termed the *frænum*. If it is small, it does not obstruct the motions of the tongue; but it sometimes ties it down, and fixes it near the inferior *dentes incisivi*, and in such case hinders children from sucking. This may easily be discovered by putting the little finger under the infant's tongue when it cries.

IN order to cut the *frænum*, we fix the tongue with the end of the finger, and passing the branches of a sharp pair of *scissars*, which should likewise be pretty large, and blunt at the point, on each side of the *frænum*, we close the *scissars* and divide the *frænum* at once. If we were to use a pair of pointed *scissars*, we should run the risk of opening one of the ranular arteries which are situated under the tongue on the sides of the *frænum*. To prevent

OF THE HARE LIP, &c. 339

prevent the incision from growing up again, let a little fine salt be put under the tongue, which will excite such motions in the child's mouth as to hinder the re-union. The nurse should also be ordered to pass her finger under the tongue two or three times a-day. This small wound requires no dressings, but will heal of itself.

OF THE HARE LIP, AND THE TWISTED SUTURE.

THE hare lip is a fissure or division in one of the lips, which is formed in two parts like the upper lip of a hare; and the same sort of division is sometimes found in the nose, ears, and eyelids.

THIS deformity may be either natural or accidental. When we extirpate a cancer or a schirrous tumor from the lip, it thereby becomes a hare lip.

NOR is it barely a deformity, but likewise a great inconvenience, as the lips serve to articulate the voice, conduce likewise to mastication, and confine the *saliva*, which would otherwise run out of the mouth. No time therefore ought to be lost in applying a remedy.

IT happens here, as in some other diseases, that nature can do nothing towards their removal till we have put her into a way of acting, so as to

unite the parts which are separated. In order to this they must be brought into contact with each other, and preserved in that situation till the nutritive juice has effected their union.

NOTWITHSTANDING the inconvenience of a hare lip, authors object against our attempting to cure it in children, because their crying will either break the stitches or tear them through the lip. This reason, at first, appears plausible, but is contradicted by experience. I have performed the operation on children of all ages, and by supporting the stitches with the dry suture, have always succeeded. They forbid it likewise where the patient has the scurvy, the evil, or the venereal disease, till they are first removed; but these distempers are no obstacles to the cure, since limbs have been amputated from persons under such circumstances, who have done very well in a short time. Another objection they make to it, relates to women who are not regular in their *menfes*; but why they should raise this objection I cannot conceive, nor do I believe the suppression of this discharge can any ways obstruct the cure.

NOTHING then but a too great want of substance in the lip should prevent us from performing the operation; for if the parts which we would have united, can be but just brought to touch, we may always hope to succeed. I have often been obliged to cut off the whole lip, and yet, by several stitches, supported by the dry suture, have always procured a re-union.

THE hare lip may be born with us, and in that case the sides of the fissure do not bleed, which circumstance is an obstacle to the union. The same inconvenience attends an accidental hare lip

AND TWISTED SUTURE. 341

lip after it has continued some time; for the sides of the wound being almost cicatrized, leave no passage for the nutritive juice, and consequently no re-union can be expected. But surgery affords a help for this by making a fresh wound, as will be more particularly mentioned hereafter. Lastly, the accidental hare lip may be only of two or three days standing, but the sides of the wound are become inflamed, swelled, and hard.

We will suppose this deformity in the upper lip, and either to have been born with us, or else accidental and of so long standing that the sides of the wound are almost cicatrized. Our business in this case is to make them bleed, as if the deformity had been accidental and recent; and in order to this, having properly prepared the patient, I place him upon a chair in a good light, with his head declining a little, and held firm by an assistant. If the division is in the middle of the lip, I first separate the *frænulum* that connects the lip to the gum, as that might otherwise incommode us in the operation; but, if the division be in any other part, the separation of the *frænulum* will be unnecessary. After this, I take the sides of the fissure one after another, and holding them with the thumb and forefinger, or with a pair of *forceps* which I deliver into the hand of an assistant, I cut through the substance of the lip in such a manner that the two incisions form an angle. Some surgeons make these incisions with scissars, others with a bistory. If I make choice of the latter, I penetrate the lip with the point of a half-curved bistory above the angle of the fissure, and passing the edge along the *forceps*, I finish the incision at the edge of the lip. I then hold the other side in the same manner, and make the like incision there,

and as the re-union is not to be attempted till the wounds have done bleeding, I touch them with some slight styptic, agreeable to the direction given in treating of futures in general.

ACCORDING to the size of the lip and of the division, I make one or more stitches, and each stitch a quarter of an inch distant from the other. The first must be made in the red part of the lip, in order to render both sides even, and to prevent any remaining appearance of a fissure. The upper stitch, or that nearest the nose, must be placed very near the angle of the division, lest any fistulous hole should remain there. If steel needles are used upon this occasion they are very apt to rust and sometimes cause an *erysipelas* in the part, at least a suppuration in the orifices which they make in passing; for this reason I always make use of gold pins, which are not liable to rust, and their heads are very convenient to hold them by, whereas the needles require the help of an instrument to push them through. The manner of passing the pins is as follows. I place the left forefinger and thumb on the right side of the lip, and exactly at the edge to bear it up, and taking the head of the pin between the other forefinger and thumb, I enter its point into the left portion of the lip and pass it out at the right, between the finger and thumb that bear it up. This pin penetrating thus at once through both parts of the lip, the future will include almost their whole substance. In the same manner I put in as many pins as are necessary, observing that the last be placed near the angle of the wound. When they are all introduced, I take a pretty large waxed thread and twist it once or twice only about the first pin, that is, I pass it alternately under the
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AND TWISTED SUTURE. 343

the head and under the point; then pass on the same thread to the second pin, and so on to the third, in such a manner that the threads cross each other upon the lip itself between the different stitches: by this means the edges of the fissure cannot either recede or rise up.

SOME authors propose to put a small compress between the lip and the gum to prevent their adhering; but this is quite unnecessary, and may prove prejudicial: first, because being wetted with the *saliva* it might probably convey the moisture between the parts which we mean to unite: and secondly, as it may keep the lip at a distance from the gum, and thereby strain the stitches. After the suture is finished, I fix a little ball of wax on the point of each pin to prevent its pricking; and this method seems preferable to the small compresses which are recommended by some authors for this purpose, as these last might be subject to strain the parts by raising the pins from the skin.

I COVER the fissure with a small linen rag dipped in some glutinous balsam, as *bals. tereb. capivi*, &c. and strengthen the stitches with slips of sticking plaster, one end of which should be stuck upon one cheek under the *os jugale*, and the other end upon the other cheek, passing above and between the pins. At the same time that these slips of plaster serve to strengthen the suture, they keep on the linen rag that covers it. It is proposed likewise to lay over the whole a compress of a sufficient length, and of a breadth proportionable to that of the lip; likewise to keep it on with a double-headed roller of the same breadth, and applied in such a manner, that it may contribute also to

strengthen the stitches by bringing the skin of the cheeks forward; but we find by experience that this bandage is generally displaced when the patient is in bed, and may disorder the situation of the other dressings. If the suture therefore is well made, it is better not to apply the bandage.

SOME practitioners disliking the twisted suture, pretend that the interrupted one is sufficient, and equally beneficial in this case: but the twisted suture has many advantages which the interrupted has not. The pins or needles used in the former, are not so likely to cut through the skin as the thread which is used in the latter. Besides, the thread, which, in the twisted suture, is turned round the pins, and is in several places crossed upon the fissure, preserves the edges of the fissure even; whereas in the interrupted suture, as there is nothing to keep the edges level, they would be apt to turn up. These, I think, are sufficient reasons for preferring the twisted suture.

As keeping the parts free from motion is necessary to promote the cure, the patient should observe a strict silence, and live upon spoon-meats, which he should take with a boat. He should likewise avoid spitting, contenting himself with wiping off the *saliva* from his lips. There is one caution more, which, perhaps, may seem unnecessary, and that is, whoever attends the patient should avoid any occasion of making him laugh. This, I say, may, perhaps, seem an unnecessary caution; but I once saw an instance where, by the patient's laughing at something that was mentioned before him, he broke out one of the stitches. When it is necessary to perform this operation upon a child at the breast, it must be fed with warm milk by a boat; for it could not suck
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AND TWISTED SUTURE. 345

without moving the lips, which would be prejudicial, or the pain hindering it from sucking, the child must be always crying.

IF the operation is well performed, the pins may be removed in two days : I have taken them out of children at the end of four and twenty hours, and found the re-union completed ; and by leaving them in too long we run the hazard of bringing on an *erysipelas* upon the lip, which may spread afterwards over the face.

WHILST the pins are taking out, an assistant must press the cheeks forward, as in the operation, and when they are removed, the thread falls off.

THE dry suture should be continued for some days longer, and the patient observe the same cautions as if the pins were still in ; for though the cicatrix is formed, it remains tender some time, and the lip, if left to a free motion, may probably divide again. It has been proposed to put a steel instrument upon children, made in a semicircular form, and the ends of it to press against the cheeks in order to support the parts when they cry ; but this appears at first sight to be unnecessary, as the dry suture is sufficient to counteract so weak a force. Besides, it seems more likely to do harm than good, for, in proportion as it presses against the cheeks, it would be more or less uneasy, and making the child cross, would keep it constantly crying.

IT remains now to speak of the accidental hare lip, which has continued about three or four days, when the divided edges are become swelled, hard, and inflamed. The twisted suture is here improper, according to the rules before laid down ; but the following Case will serve to direct what method to pursue,

IN

346 OF THE POLYPUS.

IN 1739, I was sent for to such an accident. The wound was in the upper lip, and made obliquely, extending from the middle of the lip to one side of the nose. As the twisted suture was here impracticable, I had recourse to the dry suture, by which I kept the divided parts exactly together. A sufficient suppuration ensued to bring down the swelling at the edges of the wound, and frequently the slips of plaster were so moistened by the discharge as made it necessary to apply others. The patient observed a perfect silence, and lived upon spoon meats taken with a boat; and in a fortnight the wound was perfectly united, without leaving the least blemish.

Of the POLYPUS.

THE inside of the nostrils is lined with the *membrana pituitaria*, so called because the glands therein distributed secrete a mucilaginous lymph from the blood, to which the antients have assigned the name of *pituita*. This membrane, almost in its whole extent, is of a thick and spongy texture. It is connected to the bones by a cellular substance, which, when inflated with a blow-pipe, puffs up; and it is this membrane with its cellular substance that forms the various kinds of polypuses.

WHAT we call a *polypus* is an excrescence that sometimes arises in the nose, and is generally covered with a kind of *epidermis*. We likewise find excrescences of much the same appearance situated in

OF THE POLYPUS. 347

in the ears, *pudenda*, and *uterus*; and which seem to have an equal title to the same name.

The different kinds of Polypuses.

POLYPUSES vary from each other according to the different causes that produced them, and the alterations that happen in them.

SOMETIMES a *polypus* is owing to a swelling of the pituitary membrane, which swelling may possess a greater or less space of the membrane, as also its cellular substance, and may affect either one or both nostrils. At other times it arises from an ulcer produced by a *caries* of some of the bones which form the internal surface of the nostrils.

POLYPUSES are sometimes so soft, that upon the least touch they are lacerated and bleed; at other times they are very compact and even schirrous.

SOME continue small a great while, others increase so fast as in a short time to push out at the nostril, or extend backwards towards the throat. I have known them fill up the space behind the *uvula*, and turning towards the mouth, have protruded the fleshy arch of the palate so far forwards as to make it parallel with the third of the *dentes molares*.

THERE are others, which, though at first free from any malignant disposition, become afterwards carcinomatous and even cancerous.

OF whatever nature the *polypus* be, it intercepts the passage of the air through the nostril, and when large, forces the *septum narium* into the other nostril, so that the patient is unable to breathe unless through the mouth. A large *polypus* pressing in like manner upon the *laminae spongiosae*, or the *ossa turbinata*, gradually forces them down upon the *ossa maxillaria*, and thereby

thereby compresses and stops up the orifice of the *ductus lacrymalis* : nor is it impossible for the sides of the *canalis nasal*is to be pressed together. In which case the tears having no passage through the nose, the eye is kept constantly watering, and the *sacculus lacrymalis*, not being able to discharge its contents, is sometimes so much dilated as to form what is called a flat *fistula*. I have seen instances of polypuses so much enlarged as to force down the *ossa palati*.

CAUSES. A *polypus* may proceed from two causes. First, from a disease of some of the bones that form the internal surface of the nose, which are either wholly or in part exostified or carious. In this case the pituitary membrane also, becoming distempered, swells and ulcerates, and the disease spreading, a sort of fungous excrescences shoot up from these parts, to which they give the name of polypuses. The *caries* and the ulcers may proceed either from a venereal, scorbutic, or scrophulous cause. Secondly, a *polypus* may arise from an inflammatory swelling of the pituitary membrane and an obstruction of its glands, and this swelling may be more or less extensive and considerable.

SIGNS. By the symptoms which I have already enumerated in speaking of the various kinds of polypuses, we may easily discover them, and likewise judge of their size and consistence; and in a great measure of their different dispositions. We may know by the touch whether the *polypus* is soft, or of a compact substance; its being indolent or attended with pain, will enable us to decide whether it is of a mild or of a cancerous nature; and in short, other circumstances, which we may learn by enquiring what disorders the patient

tient either is, or has been subject to, will discover whether it is venereal, scorbutic, or scrophulous. But there is one particular which it is very difficult and sometimes impossible to be certain of, and that is, from what part of the nose the *polypus* derives its root. It must either be from the *septum*, from one of the *ossa turbinata*, from the arch of the palate, or else from the *apophyses pterigoidei*. The only means of acquiring a perfect knowledge of this circumstance, is by passing a blunt probe along the body of the *polypus* and examining round it.

PROGNOSTIC. The prognostic in this case is to be collected from the following considerations, viz. the cause that produced the *polypus*, the degree of its increase, and the disorders which it may have occasioned in the adjacent parts, by its size.

WHEN the *polypus* proceeds from a venereal cause, we may expect to remove it by curing the original disease. In this case, where there is a *caries* in some of the bones which form the nostrils, the ulcer of the pituitary membrane cannot be healed till after the exfoliation of the bone, and the bone will not exfoliate till the venereal *virus* is destroyed. In all probability therefore this may prove a work of time, since, from the situation of the carious bone, no proper remedy can be applied to hasten the exfoliation; but the affair must be left entirely to nature, who is sometimes upon these occasions very tedious in her operations.

THE same thing will happen if the *caries* arises from any other cause. Nay, even if there be no *caries*, we ought to be very cautious in giving our prognostic, because of the great difficulty, as
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350 OF THE POLYPUS.

well in discovering to what particular part the *polypus* adheres, as in applying the proper remedies to it. Besides, though we may often promise a cure, we cannot secure the patient from a return of the disorder. I have extracted several, and others have appeared in the same nostril above six years afterwards, though the former seemed to have been intirely eradicated.

CURE. The cure of a *polypus* has sometimes been undertaken by applying liquid caustics to the tumor upon the end of a hair pencil or feather, but I never knew this method succeed; and the reason is this: The caustic is slow in its operation, and the *polypus* rises again as fast as it is consumed. Besides, if we could destroy what was within our view, we cannot eat away the root; and therefore I shall propose no other method than the operation, which must be undertaken in different ways, according as different circumstances occur; for all polypuses are not to be removed by the same means.

In treating of the several kinds of polypuses, I observed that some of them were of so soft a texture they were easily lacerated: these are very difficult to be extracted, unless their root is very narrow, of which it is impossible to be certain. Notwithstanding this, we are to endeavour at it; and, in order to succeed in our attempt, we are first to try whether we can discover on which side the root is situated; that is, whether the *polypus* adheres to one of the *ossa turbinata*, or to the *septum narium*; for as we are to take hold of it with the *forceps* as near the root as possible, it will be necessary to turn them differently.

THE patient being properly prepared, I seat him on a chair, with his head supported and held firm by an assistant; I then introduce a pair of perforated *forceps* into the nose, and get the *polypus* between the claws, which I advance as high as I can; at the same time directing the patient to force his breath out at his nose as much as possible, in order that the air, which cannot pass through the nostril affected, may drive the *polypus* forwards into the *forceps*. I then close the *forceps*, and turning them gently round, as often as I judge necessary, I twist the *polypus* by little and little. Thus every turn we give to that portion of the *polypus* contained within the *forceps*, is continued on to the root, and gradually loosens it.

IF the *polypus* breaks, as sometimes happens either from its softness, or from the impossibility of taking sufficient hold of it, it must be extracted by pieces, or as much of it as you can. This done, we should pass a seton up the nose, one end of which hanging out at the mouth, the other at the nostril, may serve to convey doffils armed with proper medicines to destroy the remainder of the *polypus*.

THERE is an account of such a case, in my *Observations*, page 25, and the effect of this method of treating it. It was upon that occasion I first thought of passing a seton up the nose, which had never been practised before.

WE may pass this seton either with a pair of semicurved *forceps*, or by the help of a cat-gut. If the *forceps* can be introduced along the *vomer*, I tie a seton round the end of my forefinger, and passing it into the mouth behind the *uvula*, I endeavour to meet it with the *forceps* which I pass up
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the nose. When the *forceps* touches the finger, I open the claws a little and lay hold of the seton, then withdrawing the *forceps* I bring the seton out at the nose. If the *forceps* cannot be passed, I introduce a fine cat-gut; one that is very dry, blunt at the end, and about a foot long. This will pass very easily behind the palate, so that conveying in the forefinger through the mouth behind the *uvula*, I take hold of the cat-gut, bend it, and bring it out at the mouth; at the same time pushing it up through the nose with the other hand. Thus we draw out the whole cat-gut at the mouth, and with it one end of the seton that is fastened to its extremity. Care must be taken when you introduce the finger behind the *uvula*, not to press upon the root of the tongue, which would be apt to excite a reaching that might prevent our passing the seton.

THE greatest part of the *polypus* being extracted, we may with more ease pass up a finger into the nostril; and sometimes we thereby discover the exact situation of the adherence. In which case, we fasten a small doffil to the seton, dipt in some styptic water, and drawing the seton out at the mouth, we convey the doffil either to the remainder of the *polypus*, or to the part whence we imagine it derives its root.

THE slough made by the styptic not only stops the blood, but partly destroys what remained of the *polypus*; and, by means of a doffil of this kind, we may every day convey to the part either escharotic, suppurative, or desiccative medicines, according as we judge necessary.

If the *polypus* comes away entirely in one single piece, an hæmorrhage ensues, which is sometimes very troublesome to the patient by obliging him
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to be spitting out the blood as fast as it falls down into his throat. If the bleeding is not very considerable, the patient should be directed to stoop forwards, that the blood may flow out at the nostrils; by which means, and by injecting cold water into the nose, the hæmorrhage will stop. But if the hæmorrhage is very violent, it requires the utmost care, there having been instances of people who, from the impossibility of stopping it, have died in less than an hour. In this case, the seton is a very useful and a very sure method, and should be passed as soon as possible. When we have introduced the seton, we must fasten a dossil to that end of it which hangs out at the mouth, and drawing it along the nose, convey the dossil through the mouth, so as to place it between the *vomer* and the *apophysis pterigoides*: by this means the passage is stopped, and the blood prevented from running down the throat. Another dossil put up the fore part of the nostril stops the bleeding there in the same manner; and thus the blood, being denied a passage either way, coagulates in the nose, and by degrees ceases to flow at all, the coagulation extending into the orifice of the vessel from whence it issued.

SOMETIMES those polypuses which are of a more compact substance, may be extracted in the same manner; but oftentimes they are so large as to hinder us from passing the *forceps* high enough to take proper hold of them. Add to this, that their irregular figure, which is formed according to the cavity of the nostrils, and likewise their hardness, will not admit of our twisting them like those of a softer texture. There are some, which, in proportion to their bulk, have thrown strong roots into the pituitary membrane, and thereby rendered

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this membrane very thick ; in which case there is great reason to apprehend a very troublesome hæmorrhage will attend the operation. There is an account of such a *polypus* in my *Observations* (see page 25) which extended out two fingers breadth from the nose, and likewise spreading behind the *uvula*, grew there as large as an apple ; so that I was not able to extirpate it at once, but was obliged to cut it away at different times. A proper consideration of this case may furnish such hints for destroying this sort of *polypus* as may be adapted to the different circumstances that occur ; for I cannot pretend to be particular in the manner of operating, as the figure of these polypuses may happen to be very different.

THERE is another kind of *polypus*, which is not proper to be extirpated, and that is, when the greatest part of the pituitary membrane, either on one or both sides of the nose, is enlarged by a sort of polypous swelling. I have never seen but two instances of this, in one of which the tumor was only on one side of the nose, where the bulk of the pituitary membrane (which for many years was thickened a quarter of an inch in the anterior part, and perhaps more so posteriorly) had thrust the *septum narium* into the other nostril, and intercepted the passage of the air on both sides. In the other person, the swelling was on both sides, but much larger in one nostril than in the other. In such cases, no operation can be undertaken ; but if we can discover, or have reason to suspect from any concomitant symptom, that the ailment is originally owing to the venereal or any other disease, we must apply our endeavours to cure that before we attempt doing any thing to the nose ; and it is probable that the disorder of the pituitary membrane

membrane may be removed by the use of these remedies. If, as was the case in the two patients before-mentioned, we have cause to believe that the disorder is merely local, we must have recourse to the general remedies, as diluters, bleeding, and such evacuations as will make a revulsion, and carry off the humours which lodge in the part affected; and afterwards endeavour to open an easier passage for the air through the nose.

WE may succeed herein by desiccative injections, which must be frequently repeated, and, if possible, forced into the throat; but care must be taken, that the liquor which they are made of may not be capable of doing any harm, if it should be accidentally swallowed.

To the first of these two patients, after the use of injections, which had but very little abated the disease, I tried another method, which palliated, but did not cure. I passed in a small cat-gut at the nose, along the arch of the palate, almost as far as the *uvula*. The cat-gut swelling made the passage somewhat freer, and having introduced others of the same kind for some time, I then put in a larger; and by proceeding thus several days successively, I could at last introduce three or four pretty large ones together, equal in the whole to the size of a writing-quill. They soon grew soft by the moisture which swelled them, and gave but little trouble to the patients by their hardness. These cat-guts, together with the injections, kept the passage open so as to let the air pass freely through when they were taken out; but if the use of them was omitted two or three days, the passage closed up again. Having pursued this method about a month, I found we could only obtain a palliative cure, even by con-

356 FISTULA LACRYMALIS.

tinuing the tents of cat-gut. The patient therefore only put them in at night upon going to bed, and took them out in the morning, by which means he breathed freely all day. He then returned into his own country: and as to the other patient, I saw no more of him after two or three visits.

As a perfect cure in these cases is very difficult to be obtained, I thought it proper to communicate to the public this method, which I had recourse to for the ease of the patient, and to render his disorder more supportable.

OF THE

FISTULA LACRYMALIS.

THE *fistula lacrymalis* is a deep, hollow ulcer, situated in the great angle of the eye, and generally proceeds from an abscess formed there.

BUT, in order to give a just idea of this disorder, it may be proper to describe the natural structure of the part.

AT the edge of the eye-lids, near the great angle of the eye, are placed two orifices, called *puncta lacrymalia*, which are the entrances of two short ducts that afterwards unite and form a single canal opening into the *sacculus lacrymalis*. It is by these *puncta* that the tears, which moisten the anterior part of the eye, pass into the *sacculus lacrymalis*.

THE *sacculus lacrymalis* is a sort of bladder, of an oblong figure, very small, and composed of a pretty strong membrane. This cavity, or sac, is situated in the great angle of the eye within the orbit, in a sort of groove formed by the *os maxillare superius* and the *os unguis*. As

FISTULA LACRYMALIS. 357

As it grows narrower it extends itself into the bony lacrymal canal, which is likewise formed by the same bones, and opens into the nose under the *os turbinatum inferius*, in order to carry along the tears that pass thither through the *puncta lacrymalia*. This contracted part of the sac we shall call the lacrymal canal.

THE lacrymal *sac* is liable to many different disorders, which may degenerate into a *fistula*. Sometimes this *fistula* may be owing to an inflammation of the *membrana adiposa*, and the adjacent cellular substance which communicates itself to the neighbouring parts; or it may be owing to a dilatation of the sac by the tears lodging there, either because they cannot pass through the nose, or return without difficulty through the *puncta lacrymalia*.

Of the disorders that may communicate themselves to the sac.

AN inflammation sometimes seizes on the lower eye-lid, near the great angle, which, as long as it continues, occasions the tears to run down the cheek, the swelling of the eye-lid preventing their passage through the *puncta*, at least the inferior one.

THIS inflammation requires the same method of treatment as other inflammations, viz. a proper regimen, bleeding, emollient and resolvent cataplasms, and, in a word, whatever can conduce to abate the inflammation, and promote its resolution. But as we are not always happy enough to answer these intentions, an abscess sometimes ensues; which may prove only simple, and be easily removed by making an opening into it, and applying proper dressings; or the inflammation may extend

358 FISTULA LACRYMALIS.

to the lacrymal sac; in which case, the whole portion of the sac forming the *canalis lacrymalis* may be also affected.

THIS is another reason why the tears must necessarily run down the cheek, since even the tears which are in the sac have no passage into the nose, and their lodgement only contributes to render the disease more troublesome. It is possible, however, that the surface only of the *sacculus* may suppurate, and the disorder then is easily remedied, as in the former case.

BUT it may happen, that the whole substance of the *sacculus* is affected so as not to admit a perfect resolution, in which case a suppuration comes on, and the matter makes its way through the skin. Upon opening these abscesses, we do not find the *pus* white and thick, as in the preceding case, but serous and thin, from its being mixed with the tears.

It is very seldom this disease is perfectly cured, though the opening be made ever so properly, or the dressings ever so judiciously applied; and the reason is this: the opening made into the *sacculus* will almost necessarily produce a *fistula*, for unless nature closes this opening by a firm and solid cicatrix, the tears which continually flow there through the *puncta lacrymalia*, will render it callous, and thereby hinder its healing. Thus some of the tears will pass out through the external aperture, whilst the rest are continued on through the *canalis lacrymalis*, supposing that passage to have become free by the suppuration, which generally unloads the parts that were distended by the inflammation. Nevertheless, I have sometimes known these disorders perfectly cured without any other operation than making an opening into the
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FISTULA LACRYMALIS. 359

the abscess; and admitting a *fistula* should remain, it will be always time enough to undertake the cure of it by the operation hereafter described.

THE *sacculus* having been affected by the inflammation, sometimes putrefies intirely, and sloughs away. In which case, the *sacculus* can never be restored, nor the tears pass any more through the nose. Here then a simple opening will not be sufficient, but recourse must be had to the operation; as the disease is then in the same state as that which begins in the *sacculus*.

*Of a fistula which begins from a disease of the
sacculus.*

THE *sacculus lacrymalis*, which is a membranous bag, is subject to inflammations, like other membranes.

THE cause of this inflammation is as difficult to be accounted for, as that of other inflammations, in general; I shall not endeavour therefore to explain it, but shall only observe, that if the whole sac is inflamed, it may break in one particular point, producing such a kind of *fistula* as was before described; and that it may likewise entirely putrefy and come away. In this last case, the *periosteum*, which lines the groove wherein the *sacculus* is situated, also putrefies, and upon opening these abscesses we find the *os unguis* uncovered and rotten; and sometimes the *caries* extends farther.

THESE *fistulae* frequently appear after the small-pox, in which case they must certainly have begun by the putrefaction of the *sacculus*, in or upon which some of the pustules (which are only so many abscesses) were situated. The disorder of

360 FISTULA LACRYMALIS.

the *sacculus* may spread to the cellular substance that covers it, forming one single abscess, which if not timely opened, but suffered to break of itself, the lodgement of the *pus* upon the bones, whose *periosteum* putrefied together with the *sacculus*, renders them carious, and encreases the disease. The only means of curing this sort of *fistula* is by-an operation; which does not consist merely in opening the whole extent of the abscess, for as the *sacculus* is putrefied, the disease has certainly reached to the lacrymal canal, and the natural communication between the eye and the nose, for the passage of the tears, is thereby destroyed. The method therefore of curing this disorder must be by making a new passage in order to supply the loss of the natural one, and open a way for the tears to pass through the nose.

CURE. The patient having been properly prepared, and every thing got ready for the operation, I seat him on a chair, whilst an assistant holds his head to prevent his moving it.

I WILL first suppose the abscess is not yet opened, in which case we make an incision into the whole extent of it, and fill up the cavity with lint, to keep the lips of the ulcer divided till the next day: at which time, upon removing the lint, we may be better able to judge of the state of the parts affected; whether the *sacculus lacrymalis* is destroyed or not, and whether the *os unguis* is denuded.

SUPPOSE, in the next place, that the abscess has broke of itself some time, and has produced a *fistula*; the adjacent parts approaching each other fill up and render it callous, though seldom to such a degree as to prevent us from introducing a probe into the fistulous opening, by which we may discover the progress of the disease. If we
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FISTULA LACRYMALIS. 361

find the bone bare, it is certainly carious, and the lacrymal sac is putrefied and destroyed. In this case, an incision is equally proper, and must be made so as to include the fistulous orifice. We should begin the incision very near the union of the eye-lids, where passing in the point of a strait bistoury, and guiding it along the inferior edge of the orbit internally, we make a semicircular incision near three quarters of an inch long. We might then proceed to finish the operation in the manner as will be hereafter directed; but it is better, after we have gone thus far, to fill up the wound, either with small dossils, or prepared sponge, in order to separate the lips till the next day, when it will be easier to execute what shall then be found necessary.

PRACTITIONERS are divided about the manner of finishing this operation, which is designed to facilitate the passage of the tears into the nose. Some insist that the *os unguis* should always be perforated; others will allow of no other passage for the tears than the natural one, through the lacrymal canal; but the different circumstances attending the disease must determine us which method to pursue.

IF the lacrymal sac is only opened, and not destroyed, its expansion, which extends through the bony lacrymal canal into the nose, remains intire, and the swelling that ensued from its being inflamed will soon disperse after the evacuation of the *pus*. Here then we are to conform to the intentions of nature, which originally formed this passage, and has preserved it; but if the *os unguis* is carious, or intirely bare, the lacrymal sac is destroyed; and how should that portion of it, which extends to the nose, remain sound, intire, and open? In this case, therefore, we cannot dispense

362 FISTULA LACRYMALIS.

pense with perforating the *os unguis*, in order to make a new passage for the tears.

UPON removing the lint from the wound the day after the operation, we easily discern the state it is in. If we find that the *sacculus lacrymalis* is not destroyed, we may hope to preserve the natural passage of the tears; and if we can introduce a fine probe, or a very small *bougie*, we may discover whether the entrance of the *canalis lacrymalis* is open: but, before we attempt this, we must wait till the wound suppurates, that the swelling of the canal may be gone off, at which time slight desiccative injections may be used. It has been proposed to introduce a very small *bougie*, as we do in the *urethra*, in order to enlarge the canal; but I cannot approve of this method for several reasons. First, because that part of the lacrymal sac which lines the bony lacrymal canal, is of a very fine texture, and may be easily lacerated. Secondly, the introduction of this *bougie*, and its continuance there, occasions great pain; and, Thirdly, this canal has no need of being enlarged, and if it had it could not possibly be dilated, as it is enclosed within a bony groove. It will be sufficient therefore to make injections therein for some days, taking great care not to irritate the entrance of the duct with the end of the syringe.

If, upon examining the bottom of the wound, we find the lacrymal sac destroyed, and the *os unguis* bare and carious, the bone must be perforated to make a new passage.

THE antients did this with an actual cautery, which they applied to the *os unguis* by introducing it through a *canula*, in order to prevent any injury to the other parts by the heat. This method is not absolutely to be rejected, but actual fire is
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FISTULA LACRYMALIS. 363

apt to terrify patients, and the pain of it extending to the pituitary membrane that lines the inside of the nose, must be very great; for which reasons this method is now grown out of practice. Some surgeons rather approve of breaking thro' the *os unguis* with a strong probe; but, though this method is less painful than the actual cautery, it is liable to one great inconvenience, viz. the pituitary membrane is not easily penetrated at the same time with the *os unguis*, but, on the contrary, may be separated even farther than the *os unguis* extends: I should rather chuse therefore to make use of a trocar, which will pass through the bone and the pituitary membrane at once.

IN order to do this, I remove the lint from the wound, and pass down a director, in the groove of which I convey the point of a large trocar, and perforate the bone by turning about the trocar so as to break the bone into pieces. The trocar must be directed towards the *uvula*, by which means we shall avoid hurting the *septum narium*. Nevertheless, we are to thrust it no farther than just to pierce the bone and the membrane that lines the inside of it; and we are sure with this instrument not to separate the pituitary membrane from the bone, which is an accident that may happen by breaking the bone with a probe. We may know when the trocar is got through, by a small discharge of blood from the nose. Having thus destroyed the bone, we introduce into the aperture a tent made like the *bougies* of linen, dipt in wax, and rolled. This tent should be an inch or more in length, and of the same bigness with the upper part of the trocar, running taper to the other end, which

364 FISTULA LACRYMALIS.

which should be blunt. The head or upper extremity of this tent should be provided with two wings, which fix it in the opening made in the bone, and at the same time keep the lips of the wound separate. In putting it in, it slips down and lodges itself between the internal surface of the nose and the *septum*.

THE rest of the wound is to be filled up with lint armed with a digestive, and the whole kept on with small triangular compresses and a proper bandage.

WE should change the tent at each dressing, as the intention to be answered by this operation is not only to make a passage for the tears, but also to keep it from closing again.

AFTER perforating the *os unguis*, several small pieces of bone may remain fixed in the pituitary membrane within the nose. These will generally come away by the suppuration of the little membranous portions in which they are intangled; but sometimes they lodge a considerable time, and require our assistance to hasten their discharge. The method to be used in this case is, when the suppuration lessens, to introduce a caustic into the orifice made in the *os unguis*. The *lapis infernalis* is commonly chosen for this purpose, but in passing of it, is sometimes liable to break, as once happened to me, and occasioned a great deal of trouble and difficulty to get out the piece that had lodged itself in the opening of the *os unguis*: and had it fallen into the nose or throat, it might have dissolved there, and done great mischief. Since this accident, I have always preferred a tent dipt in mercurial water, and passed into the aperture of the *os unguis*, without thrusting it far enough to touch the *septum narium*. I leave it in but for a moment,

FISTULA LACRYMALIS. 365

ment, which is long enough to produce a slough, that falls off in a few days, and brings with it the bony fragments that adhered: the application of the caustic to the part of the bone that is bare and carious, contributes also to hasten its exfoliation, which is made imperceptibly.

WE continue the use of the tent a month or six weeks, till the part of the ulcer that is situated near the orifice of the *os unguis* be deterged, and rendered so firm as not to produce any fungous flesh which might stop it up. When this is done, we endeavour to heal the external opening.

THE tears fall then into the nose as fast as they pass through the *puncta lacrymalia*, and their passage serves to keep open the hole in the *os unguis*. The tears in their natural course fell into the nose below the inferior *os turbinatum*; but, in this case, they pass into it above the superior *os turbinatum*. Undoubtedly this new passage, which is the only way that can be made to supply the want of the natural one, is not so perfect as the other, since after the cure there often remains a slight weeping.

Of the flat fistula.

THE *sacculus lacrymalis* is susceptible of dilatation, like other bladders which are constantly filling, and which are apt to lose their elasticity, when the fluid they receive passes out of them with difficulty. The urinary bladder gradually loses its elastic power by being distended when the passage of the *urethra* is obstructed. The gall-bladder dilates and yields to the quantity of bile which is confined in it by an obstruction of the *ductus cysticus*; and accordingly, upon opening these bodies after death, we find the gall-bladder very large.

The

36 FISTULA LACRYMALIS.

The lacrymal sac is of the same nature. If by any means the tears that run into it are denied a passage into the nose, the tears themselves distend it, and it gives way to the quantity of that fluid, so as to extend sometimes into the inferior part of the orbit. A swelling of the pituitary membrane is alone sufficient to prevent the passage of the tears, by choaking up and obstructing the opening of the *sacculus* into the nose beneath the inferior *os turbinatum*. This we frequently see happen in those defluxions which we call a cold in the head. A slight swelling of the membranes that form the *sac* will also have the same effect.

SIGNS. It is difficult to discover this disorder at the very beginning, but the least lodgement of the tears in the lacrymal sac will produce such an alteration in them as to make them irritate the internal membrane; and the slight pain which the patient afterwards feels in that part, together with the tears running down the cheek, are sufficient indications of the disease. We find in this case, that, upon pressing the sac with the finger, the tears which filled it will return through the *puncta lacrymalia*. It is very seldom these tears are clear, for the inside of the sac is easily inflamed, which renders them of a purulent nature and rather white.

PROGNOSTIC. At the beginning of this disorder we may hope to succeed in the cure; but when the sac is very much dilated, it irrecoverably loses its elasticity, and the tears constantly lodging there may injure it so in time as to make the sac putrefy and slough away, which will produce a *fistula* with a *caries* of the bone.

CURE. This disorder at the beginning requires a treatment very different from what is expedient
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FISTULA LACRYMALIS. 367

in its progress. At the beginning we must endeavour to remove the swelling of the lacrymal sac, or the pituitary membrane, in which we may succeed by a proper regimen, bleeding, and emollient applications in the forms of *collyria*, fomentations, and cataplasms. During the use of this method, we must empty the sac several times a day by pressing it with the finger, which makes the tears return through the *puncta lacrymalia*, and sometimes part of them pass through the nose.

IF the internal surface of the sac begins to be affected, which may be known by the whitish colour of the tears that are pressed through the *puncta lacrymalia*, they must be forced up several times a day, and two or three drops of a *collyrium*, made with white vitriol, or *saccharum saturni*, should be dropt into the eye. It has been proposed to make injections through the *puncta lacrymalia*; but if the *puncta* are open, the water dropt into the eye will pass into the sac, and the use of the syringe should be omitted, as by using it we may inflame the *puncta lacrymalia*, and the little ducts that lead into the sac. With these precautions, I have seen many of these fistulas cured that have not been of long standing, and where the lacrymal sac was not much dilated. But when the lacrymal sac is distended to three or four times its natural size, there is no probability of effecting a cure by so simple a method, and the only means we have left is an operation. The lacrymal sac indeed may be often pressed, to force out the tears that distend it; but this pressure will not empty it intirely, and perhaps may injure the sac itself by gradually irritating it, and thereby produce an abscess that may quite destroy it. It is better therefore to perform the operation before the lacrymal sac is affected
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and putrefies. In this case, the incision to be made in the soft parts is the same as was before described; and if, upon the dividing the whole extent of the sac, we find the entrance of the lacrymal duct sufficiently open to give us room to hope that the tears may be restored to their natural course, injections must be made there every day till the passage is quite free; after which the external wound may be suffered to close. Sometimes very small *bougies* have been used with success; but I would not advise them, for the reasons before given. If we do not succeed in restoring the passage leading to the nose, we must perforate the sac and the *os unguis* in the same manner as has been before directed, applying also the same dressings.

Of Wounds of the HEAD.

WOUNDS in the head may be very different according to the instrument with which they are inflicted, and the nature of the part injured. The instrument which gave the stroke may either puncture, cut, or bruise; and the impression received from it may be more or less deep: thus the soft and external parts only may be injured, or the skull and brain may have been hurt at the same time: and these differences in the wounds will necessarily be attended with different symptoms.

I do not propose in this place to confine myself to the distinctions of these wounds which have in general been made by authors since *Hippocrates*, as I flatter myself the method I am about to lay down, will set this important subject in a clearer light.

light. I shall treat then, first, of wounds of the head made by puncture; secondly, of those by incision; and thirdly, of contused wounds; as also of contusions where there is no outward wound: nor can it be thought surprizing that I should rank contusions under the article of wounds, if we reflect that it is impossible to receive a bruise without having some small blood-vessels ruptured under the skin. This then, I say, is the method I propose to proceed in, viz. to treat of wounds by puncture, incision, contusion; and likewise of contusions where there is no external wound. Each of these may affect the skin only; or they may at the same time affect the *aponeurosis* formed by the union of the frontal and occipital muscles, which covers greatest part of the skull; and also injure the *pericranium*. They may extend likewise to the *cranium*, the *dura mater*, and the brain.

Of wounds affecting only the soft and external parts.

WOUNDS BY PUNCTURE. Wounds that affect the skin only, by whatever instrument they are made, are so slight, and of so little consequence, that it is not necessary to enlarge upon them.

If a puncture penetrates either to the common *aponeurosis* of the frontal and occipital muscles, or to the *pericranium*, it will produce an *erysipelas*; for this symptom is almost inseparable from a puncture in those parts, and is owing to the smallness of the wound, which will not admit of a free discharge. In order to obviate this, we should enlarge the wound by an incision, including therein the puncture, and bring on a suppuration as soon as possible; and though an *erysipelas* may ensue, yet it will be far less considerable than if the incision had been omitted.

Wounds by incision.

A WOUND made by incision is less dangerous than the former, and should, if possible, be speedily re-united. If we cannot effect this, it suppurates, and sometimes an *erysipelas* seizes on the circumference of the wound, and perhaps on the whole head, in consequence of the wound made in the *aponeurosis*, or the *pericranium*; but this will go off by the suppuration, and the ulcer, if properly dressed afterwards, will not be long before it heals.

Wounds with contusion.

A CONTUSED wound in the *aponeurosis* may produce an *erysipelas* extending all over the head. In this case it soon affects the *pericranium*, and sometimes produces symptoms not unlike those which accompany a concussion. This *erysipelas* is followed by sinuses, which extend more or less under the skin about the circumference of the wound; for an *erysipelas* affecting the tendinous parts terminates by a putrefaction of the part inflamed, unless prevented by the humour being dispersed. To obviate this accident, or at least to hinder its becoming very considerable, we must dilate the wound sufficiently at the beginning, as its being generally lacerated makes it necessary to hasten a suppuration. If, notwithstanding this, an *erysipelas* appears, and increases so as almost to overspread the *aponeurosis* (which would be liable to create bad symptoms) scarifications must be made in several parts of the head, and especially upon the temporal muscles, to relax the *pericranium*, which in such a case is too much distended.

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The wound should be dressed afterwards according as its different appearances require, not omitting the use of bleeding, and a proper regimen, as the reader may see in my *Observations*.

A contusion without external wound.

A CONTUSION of the *aponeurosis* may occasion a suppuration, though this indeed seldom happens; but I have frequently known these contusions succeeded by violent head-achs and wandering pains all over the head, which have continued several months.

Of wounds that affect the skull.

WOUNDS which affect the skull only, or the brain at the same time, are divided into three species; relative to the sort of instrument with which they were inflicted, and the depth of the wound.

Wounds by puncture.

A SHARP-pointed instrument, as a sword for instance, may wound the skull either by a perpendicular, or an oblique stroke; in both which cases it may penetrate the first table of the *cranium* only; it may penetrate both; or passing through the skull may wound the *dura mater*, and even the brain.

WHETHER the wound be made perpendicularly or obliquely, if it has only penetrated the first table, the second can scarcely be injured, because of the shape of the instrument; and if there has been any concussion either of the skull or brain, it could be but inconsiderable. If therefore any particular

symptoms ensue, they will be such as proceed from the puncture of the *aponeurosis* and the *pericranium*. This last consideration however, joined to the possibility that the wound may have penetrated both tables, should induce the surgeon to make an incision which may discover the bone at the part injured, including the puncture in the incision (the particular manner of making this incision will be more fully explained when we come to speak of the method of trepanning). If upon examination we should find that the instrument has not penetrated through the skull, still the incision will be serviceable, to prevent the symptoms which might arise from puncturing the *aponeurosis*; and may be of use likewise in curing the wounded bone, which will probably exfoliate. (I forbear to mention the regimen to be enjoined the patient, as well as the evacuation by bleeding, which must be proportionable to his strength and the nature of the symptoms, whether it be to correct those that already appear, or to prevent others: Nor shall I speak of these particulars in treating the following cases, as I can give no other than general directions). But if the surgeon discovers that both tables are penetrated, he must apply the trepan either then or the next day, in order to lay bare the *dura mater*; and if the instrument has passed through that, he must enlarge the opening. This I look upon to be very necessary, because there will certainly be a suppuration in the brain, which, unless the *pus* has a free discharge, will destroy the patient. When the operation of the trepan is finished, the wound is to be dressed as will be hereafter directed. The aperture in the *dura mater*, which must be enlarged to the same bigness with the diameter of the crown of the trepan,

pan, will give a free discharge to the *pus* as fast as it forms; whereas had the trepan not been applied, and the wound in the *dura mater* dilated, the *pus* would necessarily collect in the brain, and do great injury there before it could possibly be discharged through the small wound made in the *dura mater* by the instrument, and the too small aperture in the skull. See my *Observations*, p. 85.

Wounds by incision.

THE *cranium* may be wounded by a sharp instrument striking directly upon it, which authors have termed *ecopé* or a perpendicular incision; whereas when the stroke is given obliquely, they call it *diacopé*; or if received so obliquely as to take off a piece of the skull, they term it *apokeparnismos*. In all these cases, the instrument may have cut only the first table; it may have penetrated both; or have affected the *dura mater* and the brain.

IN the *ecopé*, where the wound reaches no farther than through the first table to the *diploé*, the incision is not to be looked upon as the principal injury, since the second table has certainly suffered, being either fractured or considerably shocked. If it is fractured, the *dura mater* is injured in that particular part, and an extravasation of blood will ensue, and be soon attended with a drowsiness. If it has only suffered a shock, which may be called a local commotion, the *dura mater* will probably suppurate in that part, and perhaps farther. See my *Observations*, page 91. It is very necessary to be well informed of the nature of the wound; for which purpose an incision must

be immediately made through the teguments to lay bare the bone. This being done, the surgeon should attentively observe what passes. If such symptoms supervene as denote an extravasation upon the *dura mater*, immediate recourse should be had to the trepan; but if there is only a local commotion, which may be known by the slightness of the symptoms, the operation must be deferred till the seventh or eighth day.

IF the wound, which we before styled *ecopé*, extends visibly beyond the second table, the first table may be cut, because supported by the second; but the second, which has no support, is certainly fractured. In which case, after making the crucial incision, we are to apply the trepan as soon as possible; as some splinters of bones from the second table may puncture the *dura mater*, or perhaps the *dura mater* may have been wounded at the time the stroke was given.

IF the wound in the bone is oblique, which is called *diacopé*, a crucial incision must be made, and the wound in the bone laid in view. Possibly the first table only may be cut, in which case, as the stroke is given obliquely, the second table may not have suffered either a concussion or fracture; so that we must proceed no farther unless some symptoms ensue which indicate the second table's being injured. If the second table is visibly cut, we must apply the trepan as soon as possible, since, as we before observed, it cannot, strictly speaking, be cut smooth and even, but must be fractured into splinters: in all these cases, whether the wound be made either by puncture or incision, the wounded part of the bone must be included in the crown of the trepan.

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THE wound by incision termed *apokeparnisinos*, may have separated, and entirely carried away a piece of the two tables of the skull exclusive of the *dura mater*; or it may have taken off only the first table, and in that case, the *dura mater* probably is not injured, as the weapon did not press upon it. The first may be considered as an accidental trepan, the latter as a simple wound; and the more so, as the whole *cranium* underwent but a slight concussion. We should also regard those wounds as simple, if the flap of skin with the bone adhering to it, still retains such an union with the other teguments as to give hopes of its uniting by being replaced. In 1735, I found, in the churchyard at *Worms*, the skull of a person who had received such a wound with a sabre, upon the posterior part of one of the *ossa parietalia*. The piece of bone, which was round, and about an inch in diameter, had very probably been restored to its natural situation, together with the skin; for it was perfectly re-united with the *cranium*, and one might distinguish both on the internal surface, as well as externally, the *callus* which had cemented them. What was very remarkable (and shews the bone must have been replaced with very little care) one might see on the inside three small and very thin bony portions, which probably had been left between the *dura mater* and the piece of bone; to the last of which they were found united in its middle, and adhered there very strongly. As the *callus* was quite formed, and become solid like that which is found in fractures of the *femur*, and other large bones, the patient certainly recovered of this wound, and owed his death to some other cause.

If therefore we are called to dress such a wound before the air has injured the *dura mater* and the bone; we ought, after having removed the grumous blood, the splinters, or any other extraneous bodies, to replace the piece, and preserve it in its situation by the dry suture. It will be always time enough to remove it, if by the discharge of matter we find it does not re-unite; and in this case the flap must be intirely cut off, which will leave the wound in the same condition as that where it was quite taken off by the stroke of the sabre. The wound must be dressed afterwards as we shall direct when we come to treat of the manner of applying the trepan.

THE same method must be used if either the *dura mater* or part of the brain is cut with the bone.

The difference of the symptoms proceeding from a concussion, and those arising from a fracture.

A WEAPON either round or flat, or, in a word, any instrument that bruises, may be struck against the head with such force as to affect both the skull and the brain by the blow. In which case there may either be no wound, not even in the skin; or there may be a wound, penetrating more or less deep; that is, the bone may not be laid bare, or it may be laid bare, and likewise fractured. If there is a wound, the scalp is never cut clean and even, but is contused, and lacerated. In all these cases, where we suppose the effect of the stroke has reached beyond the teguments, the surgeon ought to know how to distinguish between the symptoms

symptoms that proceed from the concussion and those that are produced by the fracture of the *cranium*. Before I proceed therefore, I shall endeavour to show the difference between those symptoms; for since they serve as diagnostic signs, it is proper to be apprized of them, to prevent being mistaken.

WHEN we speak of a commotion of the brain, we mean a concussion of all its constituent parts, occasioned by a violent blow upon the head. This concussion may be either slight, or very considerable; and between these extremes we may conceive many intermediate degrees, depending upon the various forces of the concussion, as will hereafter appear.

THIS concussion interrupts the freedom of circulation in the vessels of the brain and the *meninges*; and according to the violence of it, the course of the fluids is either suspended for some moments only, or longer; it may also be intirely stopped in some of the vessels, or some small vessels may be ruptured, and thereby occasion extravasations in several places. From these different disorders, proceed dimness of sight, dizziness, loss of sense, drowsiness, bleeding at the nose, eyes, and ears, convulsions, palsy, and other symptoms which ensue as soon as the stroke is given. The degree and duration of these will be in proportion to the concussion, and the effect it has had upon the circulation. Thus when the concussion has been slight, the fluids, whose course has been but momentarily suspended, soon pass on again in their natural course, as the vessels retain their elasticity; and therefore the dimness of sight, dizziness, and even the loss of sense, may quickly cease. If the concussion

sion has been more considerable, some of the vessels have been thereby deprived, in some measure, of their elasticity, and the fluids therein contained either circulate very slowly, their course being no longer accelerated by the elastic power of the vessels; or else they absolutely stagnate, till by plentiful bleeding, and a proper regimen, the vessels are unloaded and recover strength enough to propel the column of blood, the weight of which has been diminished by the evacuations. In this case, the symptoms of the concussion continue till the natural order of the circulation is restored. But if the concussion has been very violent, the circulation is with great difficulty carried on within the *cranium*, whence the blood abounding in the external carotids may occasion a rupture of some small branches of them, and produce a hæmorrhage at the nose, eyes, ears, &c. It may happen likewise, that some vessels within the skull may either have been ruptured by the concussion, and small extravasations ensued from thence; or these vessels may have so far lost their elasticity, that the blood which stagnates in them, obstructs and bursts them by its too great quantity, and hence are produced still further extravasations. The consequence of which is, that the former symptoms still subsist, and even increase, because these last extravasations, being in the substance of the brain, will not admit relief by any surgical operation.

FROM this account it naturally follows, that the symptoms proceeding only from a concussion, begin immediately upon the stroke being given: let us now enquire whether those which arise solely from a fracture of the skull, differ from these,

these, and whether they can be discerned at the instant the blow is received.

IN whatever manner the *cranium* is fractured, several fibres, by which the *dura mater* is attached to the *cranium*, must necessarily be ruptured. If the fracture be considerable, a great many of these fibres are broken, and if the bones are displaced, the *dura mater* may probably be lacerated. All this can never happen without occasioning an extravasation of blood, more or less considerable, immediately under the skull.

WHENEVER there is an extravasation of blood between the *dura mater* and the *cranium*, the *dura mater* is pressed in upon the brain. The same thing may happen from a piece of a fractured bone beaten inwardly, and the symptom ensuing from this pressure upon the brain, is drowsiness, as may be incontestibly proved from the two following circumstances: First, we generally find this lethargic disorder go off as soon as, by trepanning, a vent has been given for the blood extravasated upon the *dura mater*, or the depressed piece of bone has been raised. Secondly, there is no drowsiness in a large fracture of the skull, attended with a wound in the teguments, if the pieces of bone do not press upon the *dura mater*, and if the *cranium* is so fractured as to admit of a passage for the blood through the fissures, as fast as it is extravasated. See my *Observations*, page 71. This being granted, I say, first, that the drowsiness is a symptom proceeding from a compression upon the brain; secondly, that it is in proportion to the degree of compression that causes it; therefore the largeness of the vessels that are ruptured under the *cranium*, or the quantity of soft parts that are divided under it, will determine the greatness

ness of the extravasation, and consequently enable us to judge how soon the drowsiness may begin to appear. Hence it is, that when the fracture is very considerable, this symptom very soon follows; whereas if the fracture is slight, it is many days before it is plainly perceived. This is what daily occurs in practice.

FROM what has been said it is evident, that the first symptoms which appear after a violent blow upon the head, are the effects of the concussion of the brain, and do not proceed from a fracture of the skull, whereas those which do not appear till some hours or days after the accident (supposing there were not any other symptoms at first, or if there were, and they had disappeared), these second symptoms, I say, are produced by the extravasation between the *dura mater* and the fractured *cranium*, or by an extravasation in the brain.

It may be proper to add here, that in a very considerable fracture, the drowsiness proceeding from the extravasation upon the *dura mater* follows so close upon the first symptoms arising from the concussion, that they are confounded together.

Wounds with contusion.

I HAVE already given an account of wounds in the skull made by puncture and incision; it remains now to speak of those made by contusion.

THOUGH nothing should appear externally but a contusion, that possibly is the least injury that has happened, since it may be attended with a concussion; or the *cranium* may be fractured either at the
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contusion or in some other part ; or else some of the sutures may happen to be displaced, and at the same time there may be a concussion and fracture ; a strong concussion, if the fracture is slight ; a slight concussion, if the fracture is large. There are many circumstances which may serve as indications of the present state of this disorder. First, the manner in which the blow is given : the stroke may have proceeded from the head itself, as when a man falls ; in which case it is probable there has been a concussion, because the head cannot fall and rebound without undergoing an action and re-action instantaneously, that is, a motion tending to the centre in the head towards the earth, and a motion reverting from it in the head which rebounds from thence. The height from which the head descends, and the place it falls upon, as upon a pavement which is a solid body, or the earth which is somewhat softer, may assist our conjectures, and enable us to judge of the force of the concussion, and of the probability of a fracture.

THE head may have received a stroke by an instrument more or less hard, which either fell upon it from a certain height, or was driven against it with force. If the patient did not fall with the stroke, the head remaining steady, there is little or no concussion in that case, and the skull may be fractured. But if the patient fell when the blow was given, we must examine whether he fell only from the impulse of the stroke, or whether the fall was occasioned by the concussion. In the first case, the nature of the weapon will determine it to be either a concussion, fracture, or both together. In the second there has been a concussion in a greater or less degree.

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THE next thing that may serve as a diagnostic is the instrument with which the blow was given. When the blow was given by the instrument, the surgeon is to consider the following circumstances, whereby he may judge whether there is a concussion or a fracture, viz. the bulk and strength of the instrument, its hardness, weight, and figure, its surface, as whether smooth or rough, the strength of him who gave the blow, his advantageous situation over the person wounded, and the disposition of his mind at that time ; also the force which may have impelled any hard bodies against the head, as gunpowder, a sling, &c. To these should be added, the patient's age, the bones being soft in youth, and harder in proportion as he is advanced in life. The part of the head which was struck ought likewise to be considered, as the bones differ in their degree of thickness ; and to all these signs let us add this one very essential reflexion, namely, If the bone is not fractured, it is certain that the whole force of the blow is transmitted to the brain, and has occasioned a concussion in a greater or less degree. If the bone yielded to the blow, and is fractured, the concussion is only communicated to the brain in proportion to the fracture : that is, the slighter the fracture is, the more the concussion is transmitted to the brain, and so *vice versa*.

THE third diagnostic arises from the symptoms. We have before proved that the only symptom proceeding from the fracture is the drowsiness ; and even that would not happen if there was a wound in the teguments sufficient to let out the blood extravasated under the *cranium* through the fissures in the fractured pieces. If therefore
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there are any other symptoms, they proceed from the concussion.

THE fourth diagnostic sign, is the time when the symptoms appear. I have already observed, that the first symptoms are the consequences of the concussion, and that, upon their ceasing, if others supervene, they are indications of a fracture, or at least of some disorder of the *dura mater*.

I RETURN now to wounds of the head made by an instrument that bruises. Whether the head is struck against that, or that against the head, we find there are three different disorders may ensue; namely, a contusion without an external wound; a wound with contusion where the bone is not laid bare; and a wound with contusion where the bone is discovered. I shall begin with the first of these. And here, if upon a consideration of the different circumstances we judge there is a fracture, or even if there is any room to suspect it, the bruised part should be opened in its whole extent; and if after having made the incision, we find the bone bare, that is, if the *pericranium* is separated from the skull, the bone has certainly suffered, and will require the trepan. But if the *pericranium* adheres, the *cranium* is not fractured, and the symptoms, if there have been any, are the consequences of the concussion. We should therefore treat the wound accordingly, by dressing it as a contused wound, and bringing it to supuration; for it will be always time enough to apply the trepan, if any symptoms should appear which indicate or give room to suspect an extravasation under the skull. We may be almost sure, if there is an extravasation, it is not between the *dura mater* and the *cranium*, but in the substance

stance of the brain, as is certain from many observations.

WHAT I have said concerning a contusion may be applied to the contused wound where the bone is not evidently discovered. To which should be added, that as the *aponeurosis* has suffered, being laid bare and perhaps wounded, we must enlarge the wound in the common teguments by an incision, in order, if the *aponeurosis* is lacerated, to dilate it, and thereby prevent the *erysipelas* and tumefaction, which will ensue if this is not done. Besides, as the instrument with which the stroke was inflicted was angular, as appears by its having made a lacerated wound, it is possible the *cranium* may be fractured, even though the stroke was given obliquely; therefore, in making this incision, the *pericranium*, which may be lacerated also, ought to be divided, to avoid the necessity of proceeding to a second operation, if after some days such symptoms should appear as indicate a fracture. This incision must be continued the whole length of the contusion that accompanies the wound, as it has often happened that in wounds made with an oblique stroke, the skull has been fractured at some distance from the part lacerated, towards one of the two angles. If upon making this incision, we find the *pericranium* separated from the *cranium*, or that it adheres but very slightly, we may conclude that the bone has suffered; and if there is a fracture, the *pericranium* will certainly be found separated at that part. I must repeat it once more, that in order to form a just prognostic, and to proceed properly in regard to the regimen, bleeding, and other remedies, we must daily consider every circumstance before-

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mentioned serving to distinguish the difference of the symptoms between a concussion and a fracture.

If in a contused wound the bone is laid bare and exposed, there is no great difficulty to discover the fracture, unless it be in the internal table only.

The different sorts of fractures, of the cranium.

SOMETIMES there is only a fissure; to which the antients have given the name of *Rogmé*. Now, whether this fissure be of greater or less extent, that particular makes no alteration in the distinction, nor will any degree of it admit of a cure without the application of the trepan.

If the length of the fissure makes any difference in practice, it is this: the extravasation being made more slowly in a small one than in a larger, the drowsiness consequently does not come on so soon, and therefore we need not be in haste to apply the trepan; for it is necessary there should be blood enough extravasated under the skull to separate from the *dura mater* the piece of bone which is to be taken out; and this we may be assured there is, if the drowsiness comes on. Whatever may be the extent of the fissure, the extravasation always happens at the part where the stroke was given; and it is there the trepan must be applied, including the fissure in the circumference of the sawed piece. But if the fissure is very long, the application of this first trepan is by no means a reason why others should not be made in different places along the extent of the fissure; for, supposing that there should be no extravasation under the fissure,

yet the *dura mater* is injured in that part, and will suppurate. This will be still more necessary if the fracture, notwithstanding the intervention of a suture, extends from one bone to another adjoining to it; for the *dura mater*, which is more strongly united to the skull at the sutures, prevents any communication between the extremities of the fissure, unless the extravasated blood has destroyed the adhesion.

THE bone may be broken into several pieces, and yet those of the external table not at all depressed, or unequal in their surface, whilst those of the internal table may. In this case, we must endeavour to take out one of the pieces; in order to which it may be necessary to apply the crown of the trepan on the side of the fracture. One piece being removed, the others are easily extracted, and the operation of the trepan is then finished, nothing more remaining to be done than with the *lenticular* to remove the angles and inequalities in the circumference of the opening, which, in this case, is very seldom circular.

BUT the fractured pieces may be depressed and drove in upon the *dura mater*: in this case, if the pieces are small, they should be all taken out, which may be done without much difficulty; but, if they are large, we are sometimes obliged to apply the trepan on the side of the fracture, in order to introduce an *elevator* through the aperture to raise up the pieces which press upon the *dura mater*.

SOMETIMES these pieces are large, but depressed on one side only, and adhere for a considerable space to the *dura mater*, from which they are only disunited in part; and adhere also to the *peri-cranium*, the teguments being unhurt. In this case,

case, the side that is depressed must be raised and placed upon a level with the *cranium*; and if, in the course of the dressings, the skin grows red and erysipelatous along the fissure that joins this piece to the sound bone, we must make an incision there, when we shall certainly find the *pericranium* separated: the trepan, therefore, should be applied in one or more places, as the *dura mater* will come to suppuration underneath the fissure in the same manner as the *pericranium* does upon it.

FISSURES sometimes begin at the place where the bone is fractured, and from whence several fragments have been extracted; and these fissures may extend a considerable way. The method of treating them is the same as in the preceding instance, where the teguments grow inflamed. If this is neglected, the *dura mater* putrefies as far as it has been injured, and the putrefaction extending to the *pia mater*, spreads afterwards to the brain, and the patient dies. See my *Observations*, page 96.

If these fissures do not extend very far, it is possible the large aperture made in the skull by the removal of the fractured pieces may afford a sufficient vent to the *pus*, and admit of remedies being passed under the *cranium* along the fissure; for which reason, I would not propose making the incision the whole length of the fissure, till we discover a redness in the skin.

WHETHER the fractured pieces are depressed or not, it is very seldom the fracture of the internal table answers exactly to that of the external; and daily experience shews us, that when the skull is broke into several pieces, the fracture of the internal table almost always extends farther than that

of the external. Upon which account, we ought in all these cases to pass a blunt probe round the circumference of the aperture, between the *dura mater* and *cranium*, in order to discover whether there is any splinter separated from the internal table that pricks the *dura mater*. If we meet with one, and it is situated at a distance from the aperture, the method of removing it must be by applying the trepan upon it; for if we attempt to extract it by any other means, the points of it may lacerate the *dura mater*.

It is impossible to discover a fracture of the internal table, when the external is not broken; for though this accident must certainly proceed from a violent blow, yet the fracture is slight: at the same time there must have been a considerable concussion of the brain, as the whole force of the blow was transmitted to that, the external table having resisted the shock without breaking. I never saw but one instance of this; and the patient dying, we found, upon examination, on the opposite side of the brain to where the blow was received, several clots of extravasated blood, occasioned by the rupture of some small vessels, the effect of the concussion. In this case therefore the application of the trepan, even upon the fractured part (though that could only be made by chance) would have availed nothing. See my *Observations*, page 62.

It is equally impossible, as soon as the blow is given, to discover the separation of a future, unless the future is situated exactly at the part where the stroke fell; for if it be in any other place, it cannot be known till some days afterwards, when a redness of the skin appears from an inflammation of the *pericranium*. In such a case, we cannot

not propose to make an incision any farther than the inflammation has produced a suppuration, the matter of which is distinguishable under the finger; and the only means to prevent this suppuration is by applying emollient cataplasms to relax the parts that are distended by the separation of the sutures, and procure a resolution of the fluids; the stagnation of which gave rise to the swelling and redness.

LASTLY, there may be a contused wound, where the bone is laid bare, but not fractured. In this case, the manner in which the blow was given will determine the nature of the accident. If it was given very obliquely, the bone may have suffered but little, and the *cranium* and brain have undergone only a slight concussion. If the stroke fell rather in a direct than oblique manner, the bone is contused; and as it afforded a resistance, the concussion of the brain will be proportionable to the force of the blow. By examining, therefore, into the different degrees of obliquity in which the stroke was given, and the nature of the symptoms, the surgeon is to judge whether the application of the trepan will be useful or not. If the *cranium* has received a very violent blow without being fractured at the part struck upon, it is possible there may be one or more fractures elsewhere. Suppose, for instance, a man falls perpendicularly with his head downwards. The weight of the body lies upon the *basis* of the *cranium*, whilst the *cranium* itself is struck on the *vertex*. If the bone resists at that part, there may, and indeed necessarily must be, a fracture on one or both sides of the head, in the same manner as by making a strong pressure upon a hoop, we crack it on each side. Instances of these fractures

have occurred, though in general they are not known till after the patient's death. If any thing can give us room to suspect or discover such an accident, it is a redness appearing in the skin that covers these fractures; which redness cannot be seen till after some days, because the inflammation of the skin is only a consequence of an inflammation of the *pericranium*. If the accident allows us time to discover it, we must apply the trepan.

PROGNOSTIC. Our prognostic, in regard to the different wounds that we have just now enumerated, ought to be formed from a consideration of the following particulars, viz. the nature of the disorder, the nature of the part injured, the symptoms that already appear, or those that may probably ensue.

THE exact account I have given of the different ways by which the head may be wounded, the several degrees of the wound, and the disorders that may result from thence, will, I presume, make it easy to form a just prognostic in these cases; and as I cannot enlarge upon this subject without useless repetitions, I shall pass on to the manner of applying the trepan.

The manner of applying the trepan.

SUPPOSING a person has received a hurt upon the head, it should be the surgeon's first care to discover as much as possible the extent of the injury; for the patient may be hurt only in one part; or he may be hurt in several, especially if he fell upon the ground. The whole head therefore should be immediately shaved and well examined, when we shall discover perhaps only a violent contusion; or there may be a wound made
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by puncture, incision, or contusion; and in this last instance, the bone is either laid bare or not. I speak here only of such cases, where the trepan may be properly used.

If there is a contusion without an external wound, the extent of the contusion ought to determine the figure of the incision, which must be crucial, angular, or in the form of a T, according to the place upon which it is to be made. And in this respect the vicinity of a suture, which ought not to be exposed unnecessarily, will make one method preferable to another. If it is allowable to chuse the figure of the incision, I should prefer either that in the form of a T, or that of an angular shape, rather than the crucial, as the last requires three incisions, whereas the others are made with two: add to this, that the crucial incision leaves four angles to be cut off, the others fewer, so as to spare the patient a considerable deal of pain.

THE incision is to be made with a sharp-pointed bistory; and it is proposed by authors to thrust the point directly down to the *cranium*, and then carry on the incision as far as is necessary, still bearing upon the point, in order to divide the *pericranium* and the teguments together; but this is a method to be pursued with great caution, since if the *cranium* is broken into pieces, the point of the bistory may happen to slip between them, and plunge directly upon the brain. When the angles of the incision are very large, part of them must be taken off; but no more than is necessary in proportion to the fracture, as the surgeon should endeavour to save as much of the scalp as possible. Particular care should be taken to separate the *pericranium* very well at the angles.

WHEN the wound has been made by a puncture or incision, and the *pericranium* is not separated, the point of the bistory must be passed through the teguments down to the bone, in order to divide the *pericranium* together with them. This done, either with the nails or a *spatula*, we must separate the *pericranium*, which adheres to the skull very closely, and then cut off part of the lips of the wound. Where the wound is made by a bruising instrument, the *aponeurosis* is contused, and sometimes also the *pericranium*; the *aponeurosis* may likewise be lacerated. In these cases, the wound must be dilated and the bone laid bare, to which the contused *pericranium* sometimes adheres but very slightly; and the wound should be made uniform by cutting off the lips. Once more, let me observe that the *aponeurosis* and *pericranium* be well separated at the angles.

If the bone is bare, there is sometimes nothing more to do than to cut off the teguments that are lacerated and contused; at other times, it is necessary to enlarge the wound by incision, to give room for the application of the trepan, and to discover all the fractured pieces.

THESE incisions will be attended with an hæmorrhage, which, in general, may be easily stopt with dry lint. If any small artery is opened, you must pinch the extremity of it so as to make a constriction, or else apply upon it a little dry lint dipt in styptic water; and when the wound has done bleeding, we may apply the trepan.

WE are forbid by authors to put a trepan upon the futures, because the *dura mater* adheres there more strongly than in other parts of the *cranium*; and they particularly forbid it upon the sagittal future, because of the longitudinal *sinus* that lies under-

underneath. They likewise prohibit the use of it upon the temporal bones, because of the arteries of the *dura mater* which are lodged in the *fulci* formed in the internal surface of those bones. These precautions might be very proper if the trepan was applied when there is no blood extravasated between the *dura mater* and *cranium*; but as the extravasation of blood has certainly destroyed the adhesion of the *dura mater* to the *cranium* (tho' the extravasation is lodged under a suture, even under the sagittal suture), therefore all the fibres which formed the adhesion before the extravasation are certainly broke; so that in this case we may trepan upon any suture whatever. It is the same thing with regard to the *ossa tempora*; the extravasated blood separates the *dura mater* from the skull, and the arteries before-mentioned are then no longer lodged in their *fulci*.

THE instrument made use of for this operation is termed a trepan, which is a saw made in the form of a crown, in the middle of which is fixed a pyramid that serves to keep the crown steady.

THE patient being situated in a proper manner, if the point of the pyramid is sharp enough to enter the bone, I place it on a firm part very near the fracture or fissure; so that the crown of the trepan may include that part of the bone which has been injured. If the pyramid is not sharp, I use a *perforator* in order to make an impression in the bone sufficient to receive the pyramid, which is designed to fix the crown so as to prevent its being displaced during the operation. The pyramid being properly placed, I make several turns with the crown upon the first table, and form an impression of such a depth as may be sufficient to fix the trepan in the bone, rendering
thereby

thereby the further use of the pyramid unnecessary. After this, I make a half-turn with the crown a contrary way, to disengage the teeth, and, taking out the crown, I remove the pyramid; and whilst an assistant cleans the teeth of the saw with a brush, I wipe away the dust that lies in the impression. I then replace the crown in the impression, and fixing it so as to bear equally on every part, I turn it about with a moderate degree of pressure, till the saw-dust begins to appear red, which shews we are got to the *diploë*.

SOME craniums are so thin that the *diploë* does not tinge the dust red, especially in old people. In this case we must proceed very cautiously, and take out the crown frequently (which would be proper indeed if it was only to clean it), observing also to wipe away the dust that might otherwise hinder the working of the teeth. While the trepan is cleaning, I feel with a blunt tooth-pick, or a flat blunt probe, whether I have penetrated any part of the inner table; and examine likewise if the impression is less deep on one side than another, that I may afterwards bear harder, where the crown has made least impression. If I find that I have got through any part of the internal table, I then press lightly upon the trepanned piece of bone, or endeavour to take it out; but without using any force, lest I should bring away only the first table. If it still remains fast, I apply the crown again, making a few turns more, and as soon as I perceive the piece loose, I extract it with the forceps.

WHEN the piece is taken out, we must smooth the lower edge of the internal table with the *lenticular*. If the blood that is extravasated upon the *dura mater* is still fluid, it passes through the perforation

foration in the *cranium*; but to make it come out more readily, I prefs lightly upon the *dura mater* with the *lenticular*, and then absorb it with lint. Oftentimes this blood is coagulated, and comes away gradually by a kind of suppuration. If there are any pieces of bone depressed, I raise them with the *elevator*, taking care, whilst I am doing this, not to force others in. The *elevator* invented by Monf. *Petit* is, I think, preferable to any other, as it has strength and safety united with convenience.

If the *dura mater* is penetrated, I take a lancet and enlarge the wound as much as possible by a crucial incision; for there will certainly be a suppuration in the brain, and it is proper the *pus* should have a free discharge.

If there is any vessel under the *cranium* that bleeds, the orifice of the trepan must be stopped with lint, so as to prevent the blood from passing out. This will necessarily form a *coagulum* there that will close up the mouth of the opened vessel; and it would be improper either to make a compression upon the *dura mater*, or to apply any styptic.

WE should be careful when we remove the dressings not to take away the first pledgets, or the *findon* that adheres to the coagulated blood, unless it presses upon the *dura mater*.

THE dressings being removed, we discover the *dura mater*, which is either in a sound state, and appears of a reddish colour; or it is diseased, and looks either very red, livid, or quite white. If it be in a sound state, we are to apply a *findon* upon it dipt in a mixture of honey of roses, and brandy. If it is very red, it is a proof of its being inflamed, and must be dressed in the same manner: but

but if it is quite white, or of a livid colour, it should be brought to suppuration; and therefore the *findon* should be dipt, either in the green balsam or a mixture of honey of roses and spirit of turpentine, in order to hasten digestion. The *findon* should be covered with small pledgets that fill up the perforation, the rest of the wound being dressed according to art, and the whole kept on with compresses, and the bandage stiled the *couvre-chef*. The same dressings will be necessary if the *dura mater* is lacerated, as in that case likewise the *dura mater* should be brought to suppuration. It sometimes happens, in the course of the dressings, that the *dura mater* being pushed outward by the brain, fills up the aperture in the *cranium*. To prevent this, the *dura mater* must be supported with a pledget of lint made in the form of the trepanned piece of bone, but applied so as not to press upon the *dura mater*. This pledget should be secured in its situation with a small plate of lead, placed between the compresses, and supported by the rest of the dressings. In large fractures where several pieces of bone have been extracted, the *dura mater* is still more liable to rise; and is to be prevented in much the same manner, by applying a plate of lead shaped like the wound in the bone, or else a pasteboard cut in the same form, and laid over the first *findon*, so as by its thickness to supply the place of the extracted fragments. For want of these precautions, I have sometimes seen the *dura mater* elevated above the perforation, and form a *fungus*, the *basis* of which was narrower than its upper part.

THIS tumor must necessarily ensue as soon as the *dura mater* rises above the external edge of the perforation, which forms a kind of ligature

ture or strangulation there; not sufficient indeed to bring on a mortification, but considerable enough to obstruct the return of the blood, and thereby occasion a swelling and distension of the superior part of the tumor. The method to be pursued in this case, is cutting off the tumor, even though the brain itself makes a part of it; for compression alone will not be sufficient. It has been proposed, in order to extirpate this fungus, to make a ligature at the root of it, even with the skull; but this would be apt to give very great pain, and might bring on an obstruction and an inflammation of the *dura mater*.

I SHOULD think it better, therefore, to cut it off even with the skull, and afterwards stop the slight hæmorrhage that may ensue by a gentle compression. The dressings must be continued in much the same manner as was before described; covering the bones with dry lint, and applying such other remedies to the rest of the wound as appear proper.

WE shall afterwards find that the *dura mater*, according to the state it is in, will sooner or later granulate flesh, which will unite it to the internal surface of the *cranium*, from which the extravasated blood had separated it: and likewise that, according to the patient's age, the bone will exfoliate, both at the circumference of the perforation, and at the surface of the *cranium*, which was laid bare. The flesh shooting out afterwards from the bone and the *dura mater*, will unite and fill up the orifice of the trepan, and the wound will soon heal.

IF a person that has been trepanned and recovers, dies some time afterwards, we shall find, upon an examination of the parts, that half of the
per-

perforation is filled with a thin *callus*, which is formed by the ossific matter oozing out of the circumference of the aperture, and the rest of it closed by the cicatrix. For this reason, a patient should be very careful after he is cured, not only to keep this part of the head very warm, but also to cover it with a plate of silver or tin, to defend it against any accidental blow; which, though slight, might cause a contusion in the brain, and cost him his life.

OF ANEURISMS.

ANEURISMS are formed by the collection of a certain quantity of arterial blood, and are distinguished under the denominations of true and false. In the first of these, the artery is dilated, and the blood which forms the swelling is still inclosed within its proper vessel. In the false aneurism, the artery is opened, and the blood that comes out of it, diffuses about the aperture, and lodging itself in the adjacent parts, raises up the teguments by its bulk.

The true aneurism.

THE true aneurism may be divided into three kinds: in the first, the whole body of the artery is dilated in a greater or less extent, forming a round, or rather oblong tumor; the *basis* of which is generally broader than its surface. In this case, all the coats of the artery have lost their elasticity, and have yielded to the quantity of blood,
but

OF ANEURISMS. 399

but are yet intire. One would imagine that these membranes should likewise have lost somewhat of their thickness at the same time that they had given way to the fluid contained in them; but, on the contrary, we find they acquire a greater degree of thickness in proportion to their distension. In the second kind of true aneurism, one of the coats of the artery is ruptured, and the others, being unable of themselves to resist the impulse of the blood, are enlarged, and form almost a round tumor, narrow at its basis, and broad at its upper part. The third species is a composition of the two former, for the whole body of the artery within a certain space is dilated; and in the middle of this dilatation arises another tumor, like that of the second kind of aneurism, the cavity of which communicates internally with the dilated artery. These three sorts of aneurisms may be of different sizes, which in general depends upon the time from which they began to form.

THESE aneurisms may happen either in the principal trunk of an artery, or in one of the branches; in the great cavities of the body, as the breast and belly, or in the extremities. The blood that fills these tumors is always fluid, by being constantly renewed; that is, as fast as one drop enters another passes out, and continues its course in the circulation: but, notwithstanding this blood is fluid, its passage in the tumor is retarded; and this remission in its motion, which is more or less considerable, according to the size of the aneurism, occasions some of the fibrous parts of the blood to separate continually from the red part, and adhering to the internal coat of the aneurismal bag, it there forms fibrous *strata*, which might be taken for real membranes, for

they harden so in time as to deceive people who have never opened such kind of tumors. As soon as the first *stratum* is hardened, another is formed within it; so that many such may be found adhering together, and are harder or softer, according as they are at a greater or less distance from the course of the fluid.

CAUSES. To produce a true aneurism, the texture of the artery must be weaker in one part than another. It is seldom this happens from an internal cause; though, as the substance of the artery is formed like the other soft parts, viz. of a *congeries* of all kinds of vessels, it is consequently liable to the same disorders to which they are incident, even the venereal and scorbutic *virus*, &c. Hence then, I say, the texture of the artery may become weaker than ordinary in some particular part: but blows, strains, and violent extensions are the more general causes. The coats of the artery losing their elasticity in the part hurt, yield to the quantity and force of the fluid that circulates in them; the aneurism begins then to form, and afterwards gradually increases.

WE likewise find true aneurisms produced by some other external causes, as by bleeding, or from a wound with some pointed or sharp instrument. Either the *capsula* which sometimes invests the artery, or one of the coats of the artery itself, having been hereby opened, the other coats are rendered weaker in that part; but in all these cases, the artery is not entirely opened, and the blood still remains within it.

SIGNS. There are particular signs which discover the different species of aneurisms, and distinguish them from all other tumors.

THE

THE true aneurism forms a tumor almost always indolent, and more or less elevated. At first this swelling is soft, but as fibrous *strata* are in time formed within the aneurismal bag, it in some measure loses its softness. Upon laying a finger upon the tumor, you may discover a beating, which answers to the patient's pulse, and by pressing upon it, if the tumor is recent, it entirely subsides, the blood that filled it returning into the artery; but it appears again as soon as the pressure is removed. If the disorder is of long standing, the swelling subsides only in part by compression, because of the fibrous *strata* which continue in the tumor; and it resumes its former size when the pressure is withdrawn.

IF the aneurism has a narrow *basis*, the fluid blood when it re-enters the artery by the pressure occasions a sort of hissing.

PROGNOSTIC. The true aneurism is more or less dangerous according to the place in which it is situated. If it happens to be in a part where the assistance of surgery cannot be employed, it will in time prove mortal, as the artery, by being over distended, will at last burst; but if it be situated within reach, the aneurism may be cured; at most can only occasion the loss of the limb, and this only if it happens to affect the trunk of an artery which is absolutely necessary for the preservation of that limb.

CURE. The cure is either palliative or radical. The palliative cure consists in the application of a bandage furnished with a pellet or a piece of lead, which pressing upon the part of the artery that is dilated, supports it, and prevents it from yielding any further to the blood, which constantly tends to

dilate it. Small and recent aneurisms may in time be cured by this means, if they are situated in a part which will allow the compression to be continued; but as to large aneurisms, there is no hopes of curing them by this method, both because of the fibrous *strata* formed within the tumor, which cannot be dispersed, and because the compression wastes, and at last wears away all the coats of the artery, and even the skin that covers it; in so much that they burst, and the patients are destroyed by the hæmorrhage. The operation therefore is the only means can be proposed, provided the tumor is so situated as to admit of it. But if, from the situation of the aneurism, the operation is impracticable, we must have recourse to the bandage. This however must be applied with caution, that is, the pellet or piece of lead ought only to be such as will be just sufficient to prevent the tumor from increasing. At the same time the *plethora* should be abated in proportion to the patient's strength; for, by emptying the vessels in general, we restrain the force of the circulation, which always tends to dilate the aneurismal bag. See my *Observations*, page 148.

THE radical cure is effected by a surgical operation.

I WILL suppose the aneurism in the bending of the arm: having prepared the patient by bleeding, a regimen, and other suitable precautions, the limb must be held by an assistant. I then apply a ligature upon the upper part of the arm, tightening it sufficiently with the *tourniquet*, to secure the hæmorrhage from interrupting our work (I shall show under the article of *Amputations* the different kinds of ligatures with the *tourniquet*, and also how to apply them). I then make a longitudinal inci-

sion through the teguments of the tumor, and lay bare the *capsula* of the artery, extending this incision beyond the aneurismal bag, and carefully dividing the *aponeurosis* of the *biceps* which covers it. But in making the incision we must proceed with great caution, lest we should open the bag at the same time with the skin, for frequently the *aponeurosis* of the *biceps*, as also the *capsula*, the bag, and the skin, seem united; especially if the patient has for any considerable time worn a bandage upon the tumor.

HAVING discovered the *capsula*, I divide it beyond the extent of the bag, and with the sponge wipe away the blood, to have a plain view of the artery; then ordering the *tourniquet* to be loosened, we clearly discover the extent of the aneurism, and I immediately direct the *tourniquet* to be tightened again: after this, I make a double ligature upon the artery, taking as much care as possible to avoid tying the nerve which accompanies it in the *capsula*. The method of doing this is by passing one needle underneath the artery and above the bag, and another needle below the bag; then tie the upper ligature, and afterwards the other, leaving the ends of the threads very long. Having thus secured the hæmorrhage, I lay open the whole aneurismal bag, and cut away a good part of it from each side. The rest of the operation must be performed in the manner as will be hereafter directed for the false aneurism.

The false Aneurism.

THE false aneurism may be of several kinds; it sometimes happens that a true aneurism bursts

by some strain or the application of an ill-adjusted bandage upon the tumor to hinder its increase; and thus a false aneurism may be produced.

AN artery ruptured under the skin forms an aneurismal tumor, or a false aneurism. I have often seen this species of aneurism arise on the head after a blow, or when the hair has been violently pulled: by which means some branch of an artery had been ruptured, and the blood extravasated under the *aponeurosis* of the frontal and occipital muscles. Others also of the same kind may happen in other parts. In these aneurisms the greatest part of the extravasated blood is fluid.

AN opening made in an artery in the thick or middle part of a limb by a pointed instrument, as a sword, lancet, &c. makes a third and fourth sort of false aneurism.

IN the third sort, the blood is inclosed in the *capsula* of the artery. This sometimes arises from the artery having been opened by bleeding, and where the hæmorrhage has been stopt by applications. In which case the orifice of the skin, as also that in the *aponeurosis* of the *biceps* and in the *capsula* have cicatrized, but that in the artery not being closed, still admits the blood through it. This blood passes only within the *capsula* of the artery, and spreads but very little, that is, in proportion as the *capsula* gives way to the blood, which extravasates slowly.

IN the fourth kind, the blood which comes out from the artery diffuses itself gradually all over the limb, that is, in the cellular substance of the fat between the muscles, and likewise under the skin; by this means forming an unequal tumor, or rather several tumors lying in contact one with

with another: the blood in these is partly grumous and partly fluid.

SIGNS. The signs of the false aneurisms differ in many respects from those which we have observed to denote the true aneurisms; and they distinguish likewise each particular kind.

THE first we took notice of, is easily known from the following circumstances, viz. the account which the patient gives of his having had an aneurismal tumor, of his having worn a compressive bandage upon it, and the manner of the blood's passing out.

It is more difficult to discover the second sort. The tumor is more or less extensive, and almost indolent, feels soft, and has a fluctuation in it like matter in an abscess. It increases gradually and without any discoloration of the skin, because of the blood's being extravasated under an *aponeurosis*. These circumstances, joined to the patient's own account, are indications of the nature of the disorder. If the blood is not collected under an *aponeurosis*, the swelling is attended with little pain, and increases gradually; the skin in several places appears yellow, or of a red colour, the extravasated blood having reached the cells of the *panniculus adiposus*, and diffused itself there.

If the artery that has been opened is inclosed within a *capsula*, like that at the bending of the arm, and this *capsula* has closed again with the teguments by the care that has been taken to stop the hæmorrhage (which often happens after bleeding, where an artery has been opened), the swelling is almost free from pain, and the colour of the skin unchanged; and if it is recent, the blood returns again into the artery upon pressure, with a sort of hissing. These circumstances have some-

times occasioned this tumor to be mistaken for a true aneurism, and the only means of distinguishing them is by informing ourselves of what has previously happened.

To conclude, if the blood does not stop within the *capsula*, but spreads between the interstices of the muscles, the tumor daily increases, grows hard, painful, unequal; and the colour of the skin in several places appears marbled, according as the extravasated blood has extended.

As these signs serve to discover the different kinds of aneurisms, so they distinguish them likewise from any other tumors.

PROGNOSTIC AND CURE. We have seen the four sorts of false aneurisms.

THE first, at the beginning was a true aneurism, which afterwards became a species of the false aneurism by the opening of the aneurismal bag and the skin that covered it. If this is situated in a part where a ligature can be made upon the artery, it should be applied as soon as possible; but if the ligature cannot be made, we must endeavour by compression, to prevent the blood's extravasating, and in some measure prolong the patient's days, though they cannot be many.

IN the second case, where there is a branch of an artery ruptured under the skin, no palliative cure can be obtained, but the whole tumor must be laid open and a slight compression made upon the bleeding artery. This will be sufficient to stop the hæmorrhage, as these arteries are small; and the wound may be dressed afterwards like a simple wound.

THOUGH, in the third kind, the blood, which is only extravasated within the *capsula*, returns into the artery upon pressing the tumor, yet it is very seldom

eldom the aneurism can be cured by any other means than by the operation, because of the great difficulty of procuring a re-union of the artery.

LASTLY, when, as in the fourth case, the extravasated blood has diffused itself either in one or more cavities, which it has formed by insinuating itself between the adjacent muscles, there is hardly ever any other remedy than the operation: I say, hardly ever, because sometimes, though seldom, they have been cured by compression.

SUPPOSING the aneurism in the arm, the compression may be made with a pellet of about an inch in diameter, from which proceed two leathern straps that are fastened with buckles upon the pellet. These straps go round the arm, so that the pellet, being properly fixed, cannot be displaced; and the two buckles allow of tightening the bandage, without either displacing the pellet, or removing the pressure upon the part affected. If it should be thought expedient to try this method, we must distinguish the place where the artery is opened from the swelling formed by the extravasated blood; for it is only upon the orifice of the artery that the pressure is to be made, and not upon the rest of the tumor; and as the extravasated blood is constantly quitting the place where the compression is made, spreading itself about the adjacent parts, the bandage must be occasionally tightened, otherwise a fresh supply of blood would be daily furnished from the aperture. By these precautions it is possible that a hard, dry clot may be formed upon the aperture, and close it up, whilst the extravasated blood, by the use of resolvents over all the limb, transpires through the skin. If, however, the patient recovers by this

means, he must still wear a bandage to support this clot.

THIS method of cure by compression may be placed among the number of palliatives, and our inducements to try it ought to depend upon the following circumstances, viz. It is necessary, if we use it, that the opening in the *aponeurosis* of the *biceps* and in the *capsula* should not have occasioned an inflammation; for if it has, or if the clots of coagulated blood, which are as so many extraneous bodies, already occasion such a compression as to endanger a gangrene of the limb, the operation is indispensably necessary, and to be performed in the following manner.

SUPPOSING the patient seated, and the arm held fast, as was directed for the true aneurism; I apply the *tourniquet* in the same manner to prevent an effusion of blood during the operation. This done, I make an incision in the skin, at the place of bleeding, according to the direction of the artery. The extent of the tumor, which is discoverable by the clots of extravasated blood, must determine the length of this incision; for if they are considerable, they must be taken out, in order to which we must allow ourselves room by sufficiently dilating the *aponeurosis* of the *biceps*. I then open the *capsula*, to discover the orifice in the artery, and if any coagulated blood is found within the *capsula*, I take it out. This done, having soaked up all the blood with a sponge, I loosen the *tourniquet*, to take a better view of the orifice in the artery, tightening it again immediately.

WE might avoid tying the ligature upon the artery, by making a compression directly upon the orifice, that is, by applying a piece of paper wetted

wetted and squeezed out, supported by graduated compresses and a bandage. Thus, in many cases where an artery is opened, a fixed compression proves sufficient till the orifice is closed; but this method is not so certain as the ligature. If therefore the compression cannot be securely made, I pass the needle invented by Mons. *Petit*, which carries two pieces of strong waxed thread, underneath the aperture of the artery, and having placed one of the threads above the opening, and the other below it, I tie them, beginning with the superior. For want of this needle we may use a common one, made blunt at the point, but the former is most convenient. I then loosen the *tourniquet* a little, to see if the ligatures are well made; and if the blood still comes out, we must renew the ligature which we find defective: if the blood flows immediately upon loosening the *tourniquet*, it shews the ligature above the orifice is in fault; but if the blood does not appear till some time after, the inferior ligature is improperly made.

SOME practitioners do not give themselves the trouble to lay the artery bare; but as soon as they have discovered the *capsula*, they pass a threaded needle deep underneath, inclosing at once the *capsula*, and as much flesh as they can with it, and then fasten the ligatures in the same manner as has been just directed. Now, though by this method they tie the nerve which is within the *capsula* together with the artery, yet it is very seldom any ill consequences ensue from thence, as the quantity of flesh included by the ligature prevents the nerve from being very much compressed.

THE ligatures being made, I lay a small roll of linen or paper, about a quarter of an inch in diameter,

diameter, cross the artery, a little above the upper ligature; which roll we keep on by several graduated compresses, and fill up the rest of the wound with lint. This little roll, by pressing upon the artery, prevents the impulse of the blood against the superior ligature, that might otherwise perhaps make it slip. The whole is to be preserved in its place by a moderate bandage, and the arm kept in a flexed position.

Of whatever kind the aneurism be, and whether cured by compression or an operation, it can be effected only by preventing the passage of the blood through the artery. It will be necessary therefore that the office of this artery should be supplied by some other. There is often a considerable branch in the right arm which proceeds from the trunk of the *brachialis* three fingers breadth below the arm-pit, and this branch supplies the defect of the trunk: if there is no such branch, the blood which passed through the trunk of the affected artery, must make its way through the small collateral vessels by gradually distending them. We should take care therefore to avoid doing any thing which may disturb this intention of nature, and on the contrary rather endeavour to assist her. For this reason the bandage should be applied easily, since if drawn tight it would obstruct the passage of the blood both in the veins and arteries. It is with the same view I omit the use of the thick compress proposed by authors to be laid along the artery above the aneurism, as it could not be kept on without a roller, which would in some degree obstruct the course of the fluids. The small roll laid across the body of the artery, above the superior ligature, serves sufficiently,

ciently, and better than this compression, to resist the impulse of the blood that descends through the arterial trunk, and does not obstruct its return by the veins, as the bandage would.

It is advised to place the limb a little raised after the operation, in order to facilitate the return of the blood; but in this case the difficulty does not lie in the return of the blood, but in its passage through the small arteries. We must deviate therefore from this rule, and in order to assist nature, already under great difficulty to send the blood to the extremity of the limb, we must place the hand somewhat lower than the elbow. Further, as heat distends the vessels, and as brandy by its spirituous parts may not only procure the resolution of the extravasated or transfused fluids, but may also accelerate the course of others which circulate too slowly, it would be proper to cover the whole arm and fore-arm with compresses dipt in hot brandy, and frequently moistened with the same. Two hours after the operation the patient should be blooded, to prevent a fever and inflammation.

To conclude, we should frequently examine the arm, to see if the part below the ligature is not in danger of a gangrene for want of the blood's circulating through it. We may discover whether the collateral branches begin to perform the office of the trunk, and the blood begins to circulate to the extremities, by the beating of the pulse and the heat of the limb.

THE first dressings may be left on two or three days; and in removing them, we must be careful to find out the ends of the threads belonging to the ligatures, that we may avoid pulling them. To pre-

412 OF THE PANARIS.

prevent likewise removing the pressure placed upon the artery above the superior ligature, we must keep a finger upon it whilst the rest of the lint is taken away; because that part of the dressings should remain on till it falls off by the supuration.

LASTLY, lest the joint of the elbow, by being too long confined in one position, should lose the freedom of its motion, it would be proper, when the wound is in a fair way of healing, to extend and bend the arm alternately, without suffering the patient to contribute at all to these motions himself. As to the motions of pronation and supination, those he may be permitted to use, provided he does not exert any force in so doing.

OF THE PANARIS or WHITLOE.

ANY collection of *pus* formed in the fingers is termed by authors *panaris* or whitloe, and is an abscess of the same nature with those arising in other parts of the body. These abscesses are situated more or less deep, which has induced the writers upon this subject to divide them into several species; accordingly they have ranged them under four heads, agreeable to the places where they are formed. The first kind of *panaris* is formed under the cuticle on one side of the nail, and sometimes all round it. The second is seated in the fat lying under the skin, between that and the sheath which involves the flexor tendons. The third is described by authors to be formed within the

OF THE PANARIS. 413

the sheath; and they still add a fourth species, arising between the *periosteum* and the bone.

The first species of Panaris.

THIS seems to be only a disease of the skin, which being slightly excoriated or irritated from some external cause, as a blow, puncture, &c. inflames and is followed by a collection of a purulent *serum* between the cuticle and true skin, which separates the cuticle first in one part only, and afterwards all round the nail. This produces a sort of transparent bladder, like that which generally appears after a burn. This bladder extends itself by little and little, and if it spreads to the root of the nail it separates it from the flesh, by matter formed underneath.

SIGNS. This species of *panaris* is easily known, It begins by a slight inflammation round the nail, with a throbbing, and by degrees raises up a small white bladder.

CURE. This disorder is as easily cured as known. As soon as the bladder is formed, it must be opened, and part of the cuticle, which forms it, should be snipt off with the scissars; otherwise the bladder sometimes spreads round the nail. After the bladder is opened, a pledget of cerate, a rag dipt in wine or brandy, in short, any desiccative application will serve for the first dressing. Next day the rest of the cuticle that is separated from the skin, should likewise be cut off, and a new one is generally found underneath; if not, there soon will be one, and the disease is quickly cured. But if the inflammation has been so considerable as to form matter at the root of the nail, the ulcer is more difficult to cure, for the nail being
loosened

loosened becomes an extraneous body in the fore, and prevents it from cicatrizing. In this case the nail must be cut away as it loosens, and some lint put between that and the suppurating flesh, in order to defend the latter from the nail. The ulcer can never heal whilst this last particular is neglected; but with these precautions and the assistance of proper applications, it will soon do well.

The second kind of Panaris.

THE second sort of *panaris*, which is formed between the skin and the sheath of the flexor tendons, is a *phlegmon*, and of the same nature with those happening in other parts.

CAUSES. This, like other phlegmons, may proceed from an internal cause, but it is generally owing to an external accident, as a puncture, excoriation, contusion, &c. The skin and fat being irritated or punctured, become inflamed, and the inflammation spreading to the rest of the fat, the whole finger swells. This inflammation may extend to the fat and cellular substance that invests the tendon of the *musculi interossei* as far as their origin, or produce sinuses quite into the substance, as well as over the surface of the hand. In this case, the symptoms are in proportion to the degree of the inflammation, and the nature of the parts affected. They are more acute than in other phlegmons, for the following reason: the skin of the finger is of a firm close texture, and therefore cannot give way to the increased size of inflamed parts which it incloses; consequently the tension, pain, and fever must be so much the more violent.

SIGNS.

OF THE PANARIS. 415

SIGNS. The nature of the symptoms incident to this species of *panaris* being the same with those of other phlegmons, it is needless to be more particular about them.

PROGNOSTIC. We must form our prognostic from the degree of the inflammation and the symptoms. If the inflammation is slight, we may hope to abate it by the assistance of art, but if the inflammation and the other symptoms are considerable, the disease is seldom cured but by suppuration; that is, an abscess will ensue.

CURE. From whatever cause this kind of *panaris* proceeds, it must be treated like other phlegmons; that is, we must endeavour to abate the inflammation by bleeding, a proper regimen, and the application of emollient and resolvent cataplasms upon the part inflamed. If by this method we do not intirely remove the inflammation, we shall at least abate it in some measure, and consequently the pain, fever, and other symptoms will be less violent. These remedies however will not always prevent a suppuration, but if there should be any matter forming it will soon be perceptible; for though the size of the finger is considerably enlarged by the swelling, yet upon examination one may distinguish a sort of circumscribed tumor at the place where the *pus* is collecting; and this is exactly the part where the finger had been pricked, excoriated, or bruised. In this case, the cataplasms must be changed, and maturatives substituted for emollients till the *pus* is formed, which it probably will be in the space of twenty-four hours. As soon as ever the matter is formed, an opening must be made, for by delaying this too long, the *pus* dissolves all the fat, and occasions such a considerable loss of substance
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in the finger, especially in mechanics whose skin and cuticle are very thick, that, the *capsula* of the articulations and the *periosteum* being putrefied, either the articulations will be found separated by the *pus*, or the bone laid bare in the middle.

IN order to make the opening, the hand is to be held fast by an assistant, and placed in such a manner that the elbow may be fixed against something firm; for if the patient is prevented from moving back his elbow, it will not be in his power to draw away his hand. It is oftentimes difficult to feel the *pus* fluctuate, as the quantity of it is not always answerable to the size of the finger; but the small circumscribed tumor before-mentioned, and the account the patient gives, who points out the place where he was hurt, and where he felt the first pain, will indicate the situation of the matter, which is generally seated near the sheath. To proceed then, I pass in the point of a straight bistory to the *pus*, and lay open the whole length of the swelling, taking care not to leave any *sinus* at the extremities of the incision; for which reason if I discover any matter passing out from thence, I introduce a director, and with my knife or scissors dilate them.

BUT notwithstanding this incision will serve to let out the matter, yet the dressings cannot be applied without difficulty and pain, unless we take off one if not both the lips of the wound; after which it should be dressed with dry lint and a proper bandage.

IT sometimes happens that the opening is delayed too long, and the matter piercing the skin, the ferous part of it lodges itself under the cuticle, and separates it from the skin almost all round the finger. Upon opening this swelling, which is almost

most transparent, and attended with a very plain fluctuation, we find that we have only opened the cuticle, which comes off almost entirely. As soon as the cuticle is removed, we discover a small hole in the skin, from whence the *pus* issues. Into this orifice we pass a director, and with the bistory dilate the aperture upwards and downwards, and afterwards take off the lips of the wound in order to the easier application of the dressings. It is more necessary to observe this last circumstance of taking off the lips, as in this case the sheath generally suppurates and comes away in a slough. If only the outside of the sheath sloughs, the flexion of the finger may be preserved after the cure; but if the whole substance of it putrefies and comes off, the flexor tendon being left bare will suppurate, and sometimes come entirely away; in which case the flexion of the finger is destroyed.

WHETHER the *panaris* is opened in time, or, as in the last case, too late, the wound must be dressed as a common wound, with this difference only, that when the suppuration is established, the aponeurotic or tendinous parts of the sore should be touched with *spir. Tereb.* or *bals. vir.* till they are digested off.

In cases where the sheath has suppurated, or where it has come away intirely putrefied, the inflammation generally extends either into the substance of the hand, or upon the surface of it to the fat that covers the muscles, whose tendons have suffered; and in consequence of this inflammation abscesses may arise there, which must be opened and dressed according to art.

The third kind of Panaris.

THE third kind of *panaris*, as described by authors, is formed within the sheath of the tendon. But though the authors who have treated this disorder agree in the use of this expression, yet, in my opinion, it gives an improper idea of it, and therefore ought to be rejected. I know of nothing within the sheath but the tendon. Do they imagine that is imposthumated? It is no more liable to do so than the other tendons in general. To clear up this affair then, I alledge, that *pus* is not always the effect of a *phlegmon*, but oftentimes of an *erysipelas*, which having affected some membranous or aponeurotic part, could not be terminated by resolution. In which case we know, that the aponeurotic or membranous part, that was affected, putrefies and produces a different sort of matter from what is found in phlegmonous abscesses. If then a *panaris* of the third species is formed, it is not, like the second kind before described, a phlegmonous abscess, but a putrefaction either of the sheath alone, or the tendon with it.

CAUSES. I do not think that an *erysipelas* affecting these parts and forming a *panaris*, can proceed from an internal cause, since we don't find that the other tendons are subject to this disorder; but it may be owing to a puncture, which has affected the tendon together with the sheath, or even the sheath only. These two parts we know are blended together at the third joint, where the tendon is inserted into the bone; it is no wonder therefore if an inflammation of the one should extend to the other. The inflammation spreads afterwards all over the hand, and along the muscle

from which the tendon arises, as far as to the forearm, sometimes even to the whole arm, forming an erysipelatous inflation, which terminates under the arm-pit, and swells the axillary glands. The pain and fever are then very violent, attended sometimes with a *delirium* and convulsions.

PROGNOSTIC. By this account of the symptoms, it is reasonable to infer that no good prognostic can be formed of the disease. We may pronounce therefore in such a case, that the patient is in great danger of losing the free use of his finger, if not the finger itself. Nay, it has happened, that by neglecting this disorder at the beginning, it has cost the patient the loss of his arm, and even of life.

CURE. The inflammation which attends this disorder seldom terminates by resolution, nevertheless this is the first intention we must endeavour to answer: and in order to effect this if possible, we must enjoin the patient a very strict diet, and bleed him several times in the other arm, applying also emollient cataplasms to the part affected. If, notwithstanding these precautions, we find the disorder increases, we may be assured that the sheath, and even the tendon itself are beginning to putrefy; and that a suppuration is on the point of being formed in all the adipose parts that cover the sheath. Must we then, as in phlegmons that are seated in the *membrana adiposa*, hasten the suppuration by the use of maturing cataplasms, and wait till the *pus* is formed? Certainly not, for if we wait for this, we shall find that when the *pus* is formed, both the sheath and the tendon, together with the *capsule* of one or more of the joints, will be putrefied. In which

case the patient must necessarily lose some of the phalanges, if not the whole finger. To prevent this therefore, we must perform the operation before the maturation is completed, by laying open the fore-part of the finger and the sheath itself down to the tendon, at the place where the pain was first felt. The incision should be sufficiently large, and the bridles formed at the joints by the sheath, which render it of a closer texture in those parts, should be exactly divided. We should also cut off the lips of the wound, as was before directed, for the more convenient and easy application of the dressings.

THE opening being made, we must still endeavour to remove the inflammation by bleeding and resolvent cataplasms, till the symptoms disappear, and the suppuration is established.

THE patient in this case will necessarily lose the flexion of the finger, but this is a misfortune proceeding merely from the disease, and not from the operation. Whilst the wound is healing, the surgeon should take care to keep the finger bent, that it may remain in the most useful position.

The fourth kind of panaris.

THE fourth kind of *panaris* is said to be formed between the *periosteum* and the bone; but as there is no intervening substance between these, I must observe again, as I did in the definition of the preceding kind, that this expression does not convey a just idea of the disorder. We may with much more reason assert that this species of *panaris* proceeds from a disease of the bone, in consequence of which the *periosteum* soon putrefies, or is attacked with an *erysipelas*, which degenerates into
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OF THE PANARIS. 421

a putrefaction : from whence it happens that, upon making an opening, the bone is found bare, and frequently carious.

SIGNS. This sort of *panaris* begins with an acute pain, which gradually increases as the disease of the *periosteum* spreads to the sheath, and the adipous parts that cover it ; and as these parts become inflamed successively, the pain and fever increase proportionably ; but the inflammation seldom extends over the fore-arm, as it is described to do in the preceding kind.

PROGNOSTIC. As the bone is affected in this case, there is great reason to apprehend the loss of the *phalanx* that is laid bare.

CURE. We can only propose the same method here as was before directed to moderate the violence of the symptoms till the *pus* is formed, and till the opening can be made where the matter is easiest felt ; for we must not treat this as we do the third species of *panaris*, by making an incision into it before the maturation is completed. It is impossible to determine, till we have made the opening, whether the patient will lose the *phalanx* or not. If the disease began at the bone, he certainly will ; for in this case we find the bone carious, and generally separated from the next *phalanx*, the *capsula* of the joint being putrefied as well as the *periosteum*. But if the disorder began at the *periosteum*, it is possible the bone may be bare only in one particular part, in which case the *phalanx* may be preserved ; but this is very seldom the case, the bone being commonly bare all round. We are to judge by the different circumstances, whether it would be proper to amputate this *phalanx*. If the bone is almost entirely separated, we must complete the separation

quite round, and take it out: this indeed is attended with some pain; but we thereby preserve the end of the finger, which is easily cured afterwards, and the finger being left thus less unsightly, the patient will be better satisfied. If the bone is bare but in one particular part, we need only cut off the lips of the incision, as was before directed, and the bone will exfoliate imperceptibly, unless the *caries* penetrates through the substance of it; in which case the bone gradually dries away, the *periosteum* putrefying all round it, and in a little time may be easily taken out, and the wound soon healed.

As to the dressings, they have nothing particular in them from those of other wounds.

OF THE

AMPUTATION of Limbs in general.

A FREE and perfect use of the limbs is a circumstance of that consequence that no means should be left untried for their cure, and to preserve their natural functions, so as to make them as useful as before they became diseased. This indeed we cannot always succeed in, being obliged, on several occasions, to proceed to amputation: thus a *caries*, or bad fractures of the bones, mortifications, and many other disorders, may make this operation necessary; but as it would be improper in this place to enter into a particular account of these diseases, I shall at present only describe the manner in which the different kinds of amputations are to be performed.

AND

OF AMPUTATIONS. 423

AND first, an amputation ought always to be made in the sound part of a limb, as it may otherwise prove of no service. Secondly, a limb may be cut off in the space between one joint and another, or it may be taken off at the joint itself. If we have no particular reason to do it in one part rather than another, it is better to chuse any place rather than the joints, because the other parts are provided with flesh capable of yielding a good digestion; whereas the joints, being surrounded with hardly any thing but *aponeuroses*, ligaments, and tendons, scarce ever suppurate laudably. If we ever amputate at the joints, it should be for one of the following reasons; first, where there is no convenient space above the diseased limb, as when the *humerus* is taken off at the shoulder; secondly, to preserve a greater portion of the limb, as when a finger is cut off at the articulation of the last phalanx with the second.

WHEN an amputation is performed upon one of the superior extremities, it should be done as low as possible, that the remainder of the limb may be useful; and the same rule holds in the amputation of the thigh, and likewise those made in the foot. As to the amputation of the leg, if we were to observe this method there, the length of the stump would be rather troublesome than useful, and therefore only so much should be left as is necessary to make a convenient rest upon the wooden leg. This will be about three or four fingers breadth below the tuberosity of the superior and anterior part of the *tibia*.

THESE are the general rules; but in regard to each particular amputation, it may be thought necessary perhaps in some respects to deviate from them.

Of the amputation of the arm, the fore-arm, thigh, or leg.

SUPPOSING we are to take off the arm, fore-arm, thigh, or leg; after having got ready the instruments and dressings, the patient should be placed in a convenient situation both for himself and the operator, and the assistants properly disposed in order to execute their parts.

If the arm or thigh are to be taken off, I place myself on the outside of the limb; if the fore-arm or leg, I stand on the inside, in order more conveniently to saw both the bones at the same time.

I THEN order the limb to be supported by two assistants, one of them holding the upper, the other the lower part of it. If the bone is splintered, the least motion of the limb would be liable to give violent pain; the assistant therefore who holds the lower part of the limb should keep it steady by placing it upon something smooth and even, as the end of a board covered with a pillow; or if it is a compound fracture, the limb should be kept in the fracture-box.

THE limb being properly supported and kept steady, I begin by applying a ligature drawn tight with a *tourniquet*, to secure the hæmorrhage; and in order that the ligature may press every where equally, it should be placed upon a part where there is only one bone, as the arm, or thigh; this is particularly necessary for the two following reasons; first, supposing we are to amputate the fore-arm immediately above the wrist, and we fixed the ligature below the elbow, the artery that
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runs between the two bones would not be compressed, but an hæmorrhage would ensue notwithstanding the ligature; secondly, as soon as the bones were divided, the ligature would press together the extremities of them, so that they would conceal the artery that runs between them. The most usual manner of applying this ligature, is to put a bolster upon the vessels, and to retain it there by a circular compress; then to apply a fillet upon that, which, after going twice round, is drawn tight by a *tourniquet* placed directly opposite to the bolster; in order to tighten this *tourniquet* with ease, I put a pasteboard between that and the circular compress, and deliver it to the care of the assistant who supports the upper part of the limbs; or we may use the *tourniquet* with screws, invented by Mons. *Petit*. Both these *tourniquets* have their advantages and inconveniences. Mons. *Petit's* *tourniquet* with screws, compresses the trunk of the vessels, but makes very little pressure any where else. For which reason, if there should be any large collateral vessel, it might bleed very considerably before the hæmorrhage could be stopt, as that could not be done till after the amputation. On the other hand, his *tourniquet* has this advantage, that, for want of a skilful assistant, the operator himself may loosen or tighten it occasionally; and upon this account it is particularly useful in the army, where many people being wounded together, some may continue bleeding and perish by the hæmorrhage for want of timely relief. Now by the application of such a ligature to each of them, the hæmorrhage will be secured till they can be regularly dressed. The other sort of ligature is also liable to an inconvenience, viz. occasioning a contusion round the

the limb where it is applied ; but that may be prevented by first putting on a roller of a sufficient breadth. Besides, the patient derives some advantage by its numbing the limb, and thereby rendering the pain of the incision less sensible, to which the *tourniquet* with screws does not contribute.

WHATEVER ligature we fix upon, after it is applied and made sufficiently tight, the flesh is to be drawn as much as possible towards the upper joint, and with the same view (that is, to preserve as much of the skin and muscles as we can, in order that the bone may be sooner covered, and the cicatrix sooner formed) we make the incision of the flesh at twice. Having received the knife (which is generally crooked, though a straight one would likewise answer the purpose) from an assistant, I carry it underneath the limb, and I divide the skin and half through the muscles at one stroke, by a circular incision made two fingers breadth below the place where we intend to saw the bones. Immediately after this, I order the skin and muscles to be drawn as high as possible, and I make a second circular incision exactly at the edge of the retracted skin. By this means we avoid cutting any more of the skin, and divide only the muscles and through the *periosteum*. I then lay aside the large knife, and take a straight bistory, with which I divide any remaining flesh that may have escaped the other incision. This bistory is chiefly useful in the amputation of the fore-arm or leg, for the parts between the two bones are certainly missed by the large knife, whereas the bistory serves to divide them exactly. The muscles and *periosteum* being thus all divided, this last incision destroys all communication of life between that
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part of the *periosteum* above the incision, and that which is below; consequently, as no sensation remains there, it is needless to scrape the bone, in order, as authors have proposed, to separate the *periosteum*. This would not only prolong the operation, but it is impossible to scrape exactly round the two bones of the leg and fore-arm: to which we may further add, that the small part of the *periosteum*, which is not scraped, is not at all capable of clogging the teeth of the saw.

SUPPOSING the assistant who is entrusted with the care of the lower part of the limb, holds it upon the end of a board, or in the fracture-box, as was before directed for a compound fracture requiring amputation, this assistant, as soon as the flesh is divided, should hold and fix the end of the bone so that it may not shake under the saw. And this he may do the more readily, since the lower part of the leg requires now no particular care, as it is void of sensation. I then take the saw, and casting an eye upon the blade to see that it is properly fixed, I apply it to the bone, and moving it gently, make the first impression. I afterwards proceed with more force, and make greater strokes, but still without bearing too hard, and when the bone is almost divided, I again move it gently to prevent splintering the bone. If there are two bones, as in the fore-arm and leg, I apply the saw to the largest, and make the first impression there; this done, I proceed, and saw both the bones together, taking care to go quite through the small bone before the other is entirely divided. I then loosen the *tourniquet* to find the situation of the blood vessels, and having discovered them, I tighten it again.

THE

428 OF AMPUTATIONS.

THE hæmorrhage may be stopt by different methods, as First, by the application of a button of vitriol to the vessel; Secondly, by applying a button of allum; Thirdly, by a ligature: Each of which has its advantages and inconveniences. The button of vitriol supported by compression is a good way; the vitriol dissolving gradually, cauterizes the vessel and the flesh to a certain height, and the blood coagulating in the vessel above the part cauterized, the eschar supports the clotted blood, and stops the hæmorrhage till the eschar falls off by suppuration. This method however is not without inconvenience; for if the button of vitriol be too large, the eschar extends farther than we would have it, cauterizing a great deal of the flesh, and sometimes the surface of the bone. To prevent this accident, the button should be very small and well supported. The button of allum, supported likewise by compression, serves equally well to restrain the hæmorrhage, by closing the mouth of the vessel, where a clot is formed, which stops the aperture in the artery; but as it produces no eschar, there is always room to fear that the clot, having nothing to keep it up, may come away, and consequently a hæmorrhage ensue. Tying the vessel then is the most secure way; though that too is attended with an inconvenience, it being very difficult to avoid tying the nerve that accompanies the artery, which after a few days sometimes brings on convulsions that make it necessary to cut the ligature.

HOWEVER, though each of these methods have their inconvenience, yet we are obliged to make use of one of them; and herein we must be determined according as different circumstances appear

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to make either of them preferable. When a patient is properly accommodated, and can be kept quiet; the button may be applied, as we may thereby secure the hæmorrhage without running the hazard of convulsions; but if the patient must be moved after the amputation, it will be proper to use the ligature as being the most secure means, and especially as the convulsions, if they do ensue, do not appear till some days after the operation. There is however a method by which the blood may be stopt in each of these cases without running the risque of any of the inconveniences before-mentioned: for which purpose we must make use of the ligature and a small button of vitriol at the same time. By the ligature we easily stop the blood, and by a small button of vitriol, which forms its eschar gradually, and produces it exactly upon the vessels to which it is applied, the ligature is included and at last becomes useless. As the convulsions seldom come on till some days after the operation, the button of vitriol need not be applied upon the ligature till the first dressings are removed. In order to make the ligature, I take a crooked blunt-pointed needle armed with two or three threads waxed together, and pass it round the vessel, taking flesh enough with it to prevent the threads from cutting through. I then tie the two ends of the threads together with a double knot, and make a single one over that. If several vessels bleed together, they must be tied one after another, unless they can all be included within the same ligature. This done, the *tourniquet* is to be loosened entirely, and the ends of the threads should be left long enough to be brought over the stump, that they may be distinguished from the lint which is to cover the wound,

wound. I then apply a small pledget of dry lint to the ends of the bones, covering the rest of the stump with soft pledgers, either of lint alone or strewed with colophony.

IN order to keep the skin even with the flesh, or rather that it may in some measure cover it if possible, we apply two straps of plaster over the lint, proportionable to the size of the stump. These straps laid crossways upon the lint have four ends, which adhering to the skin prevents its retracting towards the upper joint. We then cover the whole with a crucial compress, two longitudinal compresses applied crucially, and another passed round the stump, with a roller of a sufficient length to make five or six turns only, and not applied tight. Over all these we draw on a cap of a suitable size, and fasten it at the upper part of the limb with two pieces of tape.

THE patient being put in his bed, and the stump placed in a proper situation, we leave an assistant with him for some hours, who keeps his hand pressing lightly upon the dressings, either to support the ligature, or to retain the styptic till the eschars are formed. I forbear giving directions about the regimen, as well as the use of bleeding and other remedies, which the operator's judgment will direct him in according as the different symptoms require.

THE amputation being finished in this manner, the stump is generally two or three months in healing, according to the size of the limb, and the care that has been taken to keep the skin (which always inclines to recede) from being drawn upwards. It is for this reason that some surgeons have proposed to amputate with a flap; but of all the different ways that have been advised, that
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which seems preferable, in my opinion, is the amputation with two flaps. *Monsi. Ravaton*, chief assistant surgeon at the Royal Hospital of *Landau*, was the first who proposed this method, and by the account he transmitted to me, it appeared to be of excellent use in practice. This induced me to try it, which I did with success, the patient being entirely cured in three weeks. After this *Monsi. Vermale*, surgeon to his serene highness the Elector Palatine, having considered the advantages of this method, as practised by *Monsi. Ravaton* and myself, introduced another way of doing it, which he likewise communicated to me. I shall give a description of both, and leave the reader to compare them.

Of the amputation with two flaps, according to Monsi. Ravaton's method.

WE will suppose the thigh is to be amputated: in which case directing it to be supported by two assistants, I apply the *tourniquet* on the upper part, to secure the hæmorrhage in the manner as was before described. I then order the skin to be drawn up as much as possible, and make a circular incision, two, three, or four fingers breadth below the place where I intend to saw the bone. The larger the limb is, the lower this incision must be made, in order that the skin and flesh of the two flaps may be brought exactly together after the operation, without being too much extended. The assistant, who holds the upper part of the limb, pulls up the skin again, and I make another circular incision even with the edge of the skin, quite to the bone. Thus by the first incision I cut through the skin only, by the second I divide
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432 OF AMPUTATIONS.

the muscles. I then pass the point of a straight bistory in the fore-part of the limb directly down to the bone, and exactly at the place where I intend to saw, and I make a longitudinal incision in the flesh, continuing it down so as to make it terminate at the circular incision. This done, I make a second longitudinal incision in the posterior part of the limb answering to the first, taking care in both these incisions to avoid cutting any large blood vessel; upon which account in the fore-arm, where there are two bones, one incision must be carried along the *ulna*, the other along the *radius*; in the leg they are to be made one along the outside of the *tibia*, the other on the posterior part of the *fibula*. Having proceeded thus far, I raise up the two flaps, which are easily separated; or if there is any part which adheres more strongly, I divide it with a bistory, and afterwards keep up and secure the flaps with a slit compress. Immediately, with a small crooked bistory, I make a circular incision upon the bone at the place that is to be sawed, dividing very exactly the small remainder of flesh, and with it the *periosteum*, and then saw the bone (it would be proper to have the blade of the saw very narrow). If any small splinters remain at the end of the bone, I take them off with the incisive pincers. When the bone is divided, I order the *tourniquet* to be loosened a little, and tie the vessels as near as possible to the edge of the skin, letting the threads of the ligature pass through the longitudinal incision made in the hind part of the limb. I then wipe the whole circumference of the stump clean, and bring the two flaps, especially the skin of them, exactly together, and secure them by slips of linen spread with sticking-plaster;

plaster; taking care however that the lips of the posterior incision remain unclosed. These plasters should be about an inch broad, and long enough effectually to support the skin. I likewise pass another slip round the stump directly below the place where the bone is cut off, in order to bring together and sustain those parts of the flaps that are to adhere to the extremity of the bone.

THE dressings are as follow: First, a very thick pledget, forming a sort of quilt or cushion, which covers the end of the stump. Secondly, two square compresses pretty thick, and laid upon the sides of the flaps to keep them pressed one against the other. Thirdly, a crucial compress. Fourthly, the whole supported by five or six turns of a roller drawn moderately tight, and applied in such a manner as not to bring together the lips of the posterior incision, through which the ends of the ligatures pass. Lastly, over all, we draw on a woollen cap, which preserves the warmth of the stump.

Mons. Vermale's method of amputating with two flaps.

THE ligature being applied as usual to secure the hæmorrhage, I order two assistants to support the limb, which we will suppose to be the right thigh. This done, I take a very sharp straight bistory, between seven and eight inches long, and about half an inch broad, and turning the back of it towards the upper part of the thigh, I pass the point perpendicularly through the teguments and muscles in the fore-part of the limb quite down to the bone, and exactly at the place where I intend to saw. I then carry the

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point

point by the side and round the bone as far as the hind part, and there piercing through the muscles and the skin, I push the point out at the hind part of the thigh. I afterwards pass the edge of the bistory by the side of the bone, cutting downwards about the length of half an inch, more or less, according to the size of the limb; then turning it a little from within outwards, I divide the muscles and skin obliquely, making on this side a flap of a conic figure. The length of this flap must be determined by the eye, and it is a circumstance very necessary to be observed, to make it of a proper length, that it may exactly unite with the second flap, which we are to make next. I then apply my bistory to the fore-part of the bone at the same place as in making the former flap, and I finish the second in the same manner and with the same precautions as I did the other. After this I raise up the two flaps, and secure them with a slit compress, which I deliver into the assistant's care who supports the upper part of the thigh. This done, with a small crooked bistory, I immediately divide the flesh that remains round the bone, and likewise the *periosteum*, by a circular incision made where the bone is to be divided, and I then saw off the bone as was before directed. If there are splinters or inequalities of the bone, they must be taken off with the incisive pincers to prevent pricking the flesh when the flaps are laid over it. The vessels being tied as was before directed, I pass the threads through the lower part of the incision, then bring the two flaps together, and keep them so by the same means as was recommended in the preceding method.

I HAVE already observed, that the conic figure of the two flaps, the skin of which is somewhat longer than what is left of the muscles, renders their union more easy and exact.

I HAVE frequently tried this operation upon dead bodies, not only in the thigh, but also on the leg, where it seems less practicable, because the *tibia* is not invested with muscles like the *femur*; and it appeared to me to be more readily executed than the method before described, and more convenient for the union of the two flaps. Both the one and the other are as soon performed as the common method which we described first; and when the amputation with two flaps can be practised, it is preferable to the common method, for the following reasons:

1. THE flaps adhere to each other, and the flesh unites with the bone, consequently no exfoliation ensues.

2. THE cure is sooner obtained, as no more of the wound remains than the longitudinal incision through which the threads of the ligature are passed.

3. BY this incision the nutritive juice which oozes from such parts as do not readily unite, gradually makes its way from the middle of the stump, and these parts unite insensibly; after which the remaining small wound is not long before it heals.

4. THE flesh and skin being brought and kept together by the straps of plaster, cannot recede towards the superior joint, nor can the bone be left sticking out, as has been often seen, by a wasting of the limb.

5. As the greatest part of the wound heals very soon by this manner of performing the operation,

we thereby avoid the violent suppurations which exhaust the patient's strength; likewise the *diarrhæas* that sometimes proceed from their weak and low condition; also the reflux of purulent matter that might occur.

6. AFTER a cure performed in this manner, the bone rests as it were upon a cushion of flesh, and the cicatrix is not apt, as in the common operation, to break out again. In short, the cure is greatly forwarded, and supposing the bone cannot be covered again with the flaps, which may sometimes prove difficult in the leg, yet at least the wound is lessened three fourths, and re-united in a few days, so that nothing but the exfoliation of the bone is wanting to complete the cure.

*Of the amputation of the arm at its articulation
with the Scapula.*

I OBSERVED before, that it was better to amputate at the middle of a limb than in the joint. First, because the joints are seldom provided of fleshy parts, so that it is difficult to procure a laudable suppuration there. Secondly, because sinuous abscesses are frequently formed along the tendons which extend to the bodies of the muscles, and oblige us to repeat the operation. But the articulation of the *humerus* with the *scapula*, being invested with strong muscles, is different in this respect, and therefore the operation has been performed here with success. Nevertheless, it ought not to be undertaken in this place, unless the upper part of the *humerus* is so diseased as to make it necessary. My deceased father was the first who per-

OF AMPUTATIONS. 437

performed this operation. See my *Observations*, page 157.

THOSE who have either performed or written about this operation, observe as the first thing necessary, that sufficient care be taken to secure the hæmorrhage; in order to which they make use of a large crooked needle armed with several pieces of strong waxed thread; this they pass three fingers breadth below the arm-pit, between the *humerus* and the vessels running to the inside of the arm; then laying a thick straight compress upon the skin, they make the ligature, including therein the compress, skin, and vessels. This being done, and the arm amputated, they make a second ligature under the arm-pit; but the first of these ligatures is very painful, greatly prolongs the operation, and, in my opinion, may safely be omitted; for by finishing the incision at the part where the vessels are situated, we may immediately take hold of the end of the artery.

SUPPOSING this operation necessary and practicable, we seat the patient in a chair, the back of which is lower than the arm-pit; and in order to prevent his raising himself up, which, from the pain, he would be very apt to attempt, I pass a cloth over his belly, and tie it behind the back of the chair; an assistant then holding the arm firm, with the elbow four fingers breadth from the body, I take a long bistory, or instead of that a razor made fast in its scale, and I make a transverse incision through the greatest portion of the deltoid muscle at its upper part, and a little lower than where the *capsula* of the joint is connected to the *humerus*. This done, I immediately direct that part of the muscle which is left, to be raised by an

438 OF AMPUTATIONS.

assistant, and with a second division I divide part of the *capsula* transversely, and likewise the tendon of the *musculus supraspinatus* which is inserted there. After this, introducing my finger to discover the joint, I take another bistory, fixed in its handle, and blunt, and I finish the incision of the *capsula*, cutting from within outwards, and at the same time divide the tendons that pass over it, and also the tendon of the *latissimus dorsi*. Having proceeded thus far, I direct the assistant who supports the arm to push the *humerus* upwards and dislocate it, which is easily done, as it is now no longer confined by the *capsula*; then sliding the edge of my knife between the head of the bone and the glenoid cavity, I finish the incision on the inside of the arm, directing the edge of the bistory between the bone and the vessels as far as two or three fingers breadth below the arm-pit. There I finish the separation of the flesh, leaving only a small flap of it in which the artery lies.

THE arm being separated, we discover the trunk of the artery from whence the blood proceeds, which I immediately take hold of with the forefinger and thumb of my left-hand, and make a strong ligature upon it under the arm pit. If the flap is too long, I cut part of it off below the ligature, and if there be any other branch of an artery that bleeds, we likewise tie that.

THE operation being finished, I clean the circumference of the wound, and bringing the flaps together as near as possible, I secure them in that situation with straps of sticking-plaster, in order to procure the re-union of the greatest part of the flesh. The glenoid cavity of the *capsula* should be dressed with

OF AMPUTATIONS. 439

with dry lint, and in time it will produce new flesh, which will unite with the adjacent parts. The rest of the wound is likewise to be dressed with dry lint, and the whole kept on with a proper bandage, applying the same dressings afterwards as are usual in other amputations.

It may at first appear proper perhaps to leave flaps of a sufficient length to bring the lips of the wound exactly together, and procure a speedy re-union of them, as in the operation before described; but in this case that method is impracticable, for if the flesh was to cover the glenoid cavity, it could not unite with it, as only parts that are recently divided can be re-united according to the first intention. For this reason therefore only so much of the flaps must be left on as is necessary to procure the re-union of the greatest part of the flesh which still bleeds, bringing them towards each other, and securing them in that situation as has been before directed.

Of the amputation of the Fingers.

THE amputation of the fingers is never performed unless for one of the following reasons, viz. when they are gangrened; when the *capsula* of one of the joints is destroyed by putrefaction; when one or more of the phalanges are fractured with a considerable wound, as in those made by gunshot; or else when the bone is intirely rotten. Supposing it necessary to perform the amputation of the first phalanx, it may be taken off singly, and the others preserved.

THESE amputations may be made either at the joints or in the middle of the phalanx; but if there

is the least reason to suspect that the joint is injured, we must in that case, pursuant to the established rules before-mentioned, which direct us to preserve as much of the limb as we can, but at the same time to cut only in the sound part; we must then, I say, saw the bone above the joint, to preserve at least half of this phalanx.

As the vessels are small, there is no fear of any considerable hæmorrhage during the performance of these operations, consequently there is no need to apply the *tourniquet*.

BEFORE we proceed to the operation, the assistant who holds the hand, must secure it in such a manner as to prevent its being moved; in order to which he should place the patient's elbow against something firm, which will hinder his drawing it back.

If we make the amputation in the middle of the phalanx, I take hold of the end of the finger, and by a circular incision cut through the flesh to the bone, after which I divide the bone with a small saw. Sometimes in these cases we have an opportunity to make the double incision as in the leg or arm, in order to preserve the greater share of skin, and that the bone may be sooner covered.

WHEN we amputate at the articulations, we should previously consider the structure of them, in order to avoid wounding the cartilage that covers the end of the sound bone.

IN amputating one of the two phalanges that are articulated by *Ginglimus*, we ought first to be well assured of the situation of the articulation. If the finger is not much swelled, we may discover this by bending the phalanx; but if the swelling is so considerable as to prevent this motion, we must judge

judge of it as near as we can, observing this caution however, to begin our first incision rather upon the bone that is to be amputated than upon the adjoining sound bone, to avoid doing any injury to the latter.

THE method of doing it is as follows. I take hold of the end of the finger and make a semicircular incision on one side of the joint, by this first stroke dividing the soft parts quite to the bone. I then thrust the nail of my fore-finger into the incision, and examine for the joint, in case it is difficult to be discovered. Having found it, I divide a good part of the *capsula* of the articulation, inclining the edge of the bistory rather towards the diseased phalanx; and instantly I half luxate this phalanx, which is now very easily done, as the *capsula* no longer affords any resistance; after which I complete the division of the *capsula* together with the remaining flesh.

If we are to amputate at the first phalanx, which is articulated by *Ginglimus*, with the metacarpal bone, we must bend the finger to discover the articulation; but if the disorder will not permit this, the joints of the other fingers may serve to direct us, as they are almost parallel with each other. I then divide the skin on each side the finger with a straight bistory, as high up as the articulation, separating in some measure this finger from those on each side; which done, I divide part of the *capsula* of the articulation by a transverse incision, made externally or internally, according as is most convenient. When we have proceeded thus far, we bend the finger and finish the amputation, taking care to divide the flexor tendons without straining them.

442 OF AMPUTATIONS.

As the cavity in the first phalanx moves upon the head of the metacarpal bone, which is round, we may be very liable to injure this with the bistory, unless great care be taken to avoid it.

In whatever manner we perform the amputation of the fingers, whether it be in the middle of the phalanges or at any of their joints, there will be no occasion to make a ligature upon the vessels; the coagulated blood, which will be lodged in the dressings, being sufficient to stop the hæmorrhage.

THE dressings are a little lint, one or two crucial compresses, and a single roller.

WE cannot expect much discharge from these parts, as they are chiefly composed of bony and tendinous substances; and upon this account the dressings, by growing hard, would be liable to produce an inflammation there, and be attended with great pain; but, in order to prevent this, we should moisten them some hours after the operation with *ol. hyper.* and repeat this three or four times till the first dressings are removed, which should not be attempted before the fourth day at soonest.

THE rest of the dressings are the same with those made use of in the amputation of a leg.

IF the amputation is made in the joint, the cartilage at the end of the bone will be covered with flesh in a few days without any visible exfoliation; but if we amputate in the middle of a phalanx, we find the bone turn black soon after, and a sensible exfoliation must ensue. In order to promote this, the bone should be touched two or three times with the *lapis infernalis*, and in four or five and twenty days the exfoliation will be made, and the cicatrix soon afterwards be formed.

IF

OF AMPUTATIONS. 443

IF the inflammation spreads to the hand, it is possible, in the course of the dressings, that sinuses or abscesses may be formed along the finger or along the hand, either on the fore or back part of it, this being an almost necessary consequence of the inflammation that preceded the amputation. In which case they should be opened without delay. See the article *Of Abscesses*.

Of the amputation of the bones of the metacarpus and metatarsus.

IF there is a *caries* in one of the metacarpal or metatarsal bones, and no exfoliation can be procured, it will be necessary to saw off this bone; and it will be better to do this a little above the *caries*, if we have room, than at its articulation with the carpal or tarsal bone; for as it is only united to them by very strong ligaments, an erysipelatous swelling would be the almost necessary consequence of the operation, if made in the joint. If we intend to saw off one of these bones, we must separate the adjacent parts from it by a parallel incision made on each side as high as the place where we intend to saw. That being done, we divide the muscles and tendons which lie upon the bone with a crooked bistory; and in order to make this circular incision more conveniently, and to do it exactly at the angles of the two parallel incisions, we introduce a director into these angles one after another, the groove of which serves to conduct the bistory. We then take hold of that end of the bone which is articulated with the fingers, and with a very narrow saw divide it, taking care in doing this, that the teeth of the saw

444 OF AMPUTATIONS.

saw do not wound the neighbouring bone; and for the greater security in this respect, we should put a card or a very thin plate of lead between these two bones, to prevent the last stroke of the saw from injuring the sound bone. See my *Observations*, page 36.

THE dressings require nothing different from what has been directed in treating of the amputation of the fingers.



O B S E R V A T I O N S

B Y

Mr. C H E S E L D E N.

THERE are very few passages in the foregoing sheets, in which I have ventured to differ from M. *Le Dran*; wherever I have, it has not been without suspecting my own judgment; and I confess I have never read any book of surgery, from which I have learnt so much as from his. The judicious reader will discover in it the greatest experience joined with the clearest judgment; and the young student will find an exactness, and a descending to the minutest particulars, which to him will be extremely useful, not to say necessary. I hope the plates which I have added (many of which are drawn with my own hands) will have the use which I intended, and give a clearer idea of the several operations than can possibly be given by any verbal description.

P L A T E I.

A, A FRACTURE of the skull where the scalp is taken off, sufficient for the application of the trefine in any proper place. This fracture goes across the sagittal suture, which sometimes extends from the nose to the back-part of the head, under which lies the longitudinal sinus, and over which
the

the trefine should never be applied. And if one perforation is not sufficient for raising such a fracture, or if it should be necessary to open the *dura mater* to discharge any extravasated blood or matter, it will in this case be necessary to make another perforation on the other side of the sinus: for no instrument should be applied over that sinus, nor ought the *levator* to be ever introduced between that and the skull.

I HAVE heard of an operation upon the middle of the *os frontis* by an ignorant surgeon, who wounded the longitudinal sinus or vessels that empty into it, and not knowing what he had done, concluded at first that this blood had been extravasated before, but the quantity soon convinced him of his mistake; upon which he stopt the bleeding with dry lint, and had the good luck to save his patient.

B, A FRACTURE in the parietal bone, where the trepan is but once applied, as that may be sufficient for the purpose.

IN this, as in the former, the skull is bared with the same regard. And here I must observe that the vessels in both are to be secured by ligatures, as soon as the scalp is taken off, that the operation may be proceeded upon without delay. It may be observed that the trepan in these operations is not applied to the most dependent parts, nor do I think that necessary: however, a patient being laid in bed, there will not be found much difference. See *Chefelden's Anat.* page 39, last Ed.

IN cases where the fractured bone is not loose, great advantages arise from making the operation as is here directed; but where the fractured bones are loose, we must be contented to make the operation as close as we can to the fracture.

PLATE

P L A T E II.

Instruments for the foregoing operation.

IN private operations I prefer the trefine, though the trepan may be thought more useful where expedition is necessary, as in a battle, or a sea engagement. A, the handle of the trefine, which should be made so heavy that the hand may have little more to do than to direct it. B, the head or circular saw of the trefine, which must be made conical, that the cavity in the inside may enlarge in the same manner that the outside does; otherwise the piece of bone, that is to be taken out, may chance to be wedged in the cavity, and obstruct the operation, which has sometimes happened, even where the crown or head is conical, when the instrument-maker has neglected to give it the same shape on the inside. Besides, without the shape it is impossible to lean the instrument to one side or the other, as occasion may require during the operation. I must also recommend to instrument-makers to take care to make the teeth large, to prevent their clogging; and to make it of the best steel; for if the teeth are not hard the operation cannot be expeditious. C, an instrument to be put into the handle of the trefine, to make the central perforation, which also should be of tempered steel. D, a screw to fix these two last parts in the trefine. E, the pin to be screwed in the middle of the head, to direct it till the teeth of the circular saw have made a sufficient groove to keep it steady. F, an instrument to screw and unscrew the pin. G, a pair of watch-maker's pliers, to take hold of any splinters of bone: these the instrument-makers

makers should have always ready of different sizes, and made with teeth (the common ones being like a file) as it is a most useful instrument in surgery.

THE rest of the instruments, which usually accompany these, I have never had occasion for, and think them not worth describing. The piece of bone to be cut out, I have always completely separated by the head of the trefine, and even taken it out with it. This leaves no splinters to do mischief, and makes the lenticular useless; nor have I ever used the forceps or raspatory.

N. B. ALL the instruments in this book are either made to their proper size, or to a scale of inches, that their true size may be rightly understood.

P L A T E III.

FISTULA LACRYMALIS.

A, THE lacrymal sac and ducts, where the matter is contained in the disease called *fistula lacrymalis*. The passage from the lower side of the *sac* into the nose being in this disease always obstructed, the matter is easily squeezed out at the eye through the *lacrymal ducts*.

BB, PART of the instrument, with which, after the *sac* is opened, we perforate into the nose. This shews the proper place and direction in which the operation should be performed.

C, THE Crista Galli.

D, THE antrum of the upper jaw.

E, THE frontal sinus.

F, THE sphenoidal sinus.

G, THE canula for the operation, fixed in its place. After the incision and perforation are made

made, the wound must be enlarged with a sponge tent, and kept open for a day or two, before the rest of the operation is performed.

P L A T E IV.

Instruments to the fistula lacrymalis.

A, THE cautery, which being heated in a chafing-dish of coals, we wet that part which we would not have hot, and then immediately pass it through the canula. The small end of the canula should not pass into the nose, and the cautery should not enter above half an inch, even in a man.

B, THE canula, whose aperture at the entrance must be above twice the diameter of that at the other end, by which means there will be room for the cautery to move about, and it will be less apt to heat the canula: To prevent which also it is proper to wrap the canula in a wet rag. These things being neglected, great mischief has been done by burning the eye-lid, and thereby disgracing the operation. And very probably the entrance of the ducts into the lacrymal sac have been burnt also, which prevents the tears from ever passing that way: but these cautions being used, no such thing ever happens. Other methods of curing this disease have been much commended, though often unsuccessful; but this, well performed, is infallible.

C, THE perforator for the *fistula lacrymalis*, which need not be very sharp pointed.

PLATE V.

HARE-LIP.

A, A hare-lip, with a pricked line marking how much should be cut off, in order to perform the operation. In the division may be observed a tooth, which usually projects in this manner in those cases where the jaw-bone is divided as well as the lip. This tooth, with so much of the jaw-bone as is protuberant, must be taken off previous to the operation; and the lip largely severed from the gum.

B, THE pins, which being first thrust through one side, are then directed perpendicular to the surface of the wound on the other side: for if the two sides of the wound are held together, and the pins thrust through both sides at once, the inside of the wound will be close, but the outside will gape, and make an unseemly scar.

C, THE wound closed with the pins.

D, THE manner of fixing the wound with ligatures. The pins should be made of gold, or at least of silver, with their points armed with steel.

E, AN instrument called a nail-nipper, which I have found extremely useful in taking off a bit of the jaw-bone, as mentioned in letter A.

N. B. It must be the straight-edged nail-nipper, as expressed in the plate.

PLATE

P L A T E VI.

P O L Y P U S.

A, THE septum nasi. B, a polypus, with a ligature to extract the polypus backwards; the two ends of this ligature are to be pushed through the nose by a small wire or a bit of cat-gut. This operation was explained to me at *Paris*, but I cannot remember by whom. C, the palate; D, an instrument added for the more convenient direction of the cord. E, the polypus, which comes forwards, and is usually extracted by the forceps. F, the *os spongiosum*, from which in both these cases the polypus arises. G, the *iter ad aurem*, which by being covered with the polypus, as in the uppermost of these prints, sometimes occasions a degree of deafness. These prints sufficiently explain to the operator the situation of a polypus, and why the forceps should be first introduced on the under side. These both spring from the membranes of the *os spongiosum*, from whence they commonly proceed, though there is no part of the membrane of the nose from which they do not sometimes arise.

P L A T E VII.

Amputating Instruments.

A, AN amputating saw, the frame of which is made strong, that the blade may be firmly extended; and of sufficient weight to render the working

of it easy. The blade should be made out of a clock spring, which by long experience workmen have learnt to temper to the utmost perfection. Such saws are used by all artificers who cut ivory and other hard substances, particularly comb-makers, where the sharpest saws, as well as the nicest direction, are required. But the teeth must be made larger and wider than theirs, as a green bone will sooner clog the teeth than a dry one. From the experience of these people, I have also learnt the fitness of placing the handle in a line with the back, as in the plate; for as they rightly observe, as soon as the teeth of the saw are fixed to the bone, the weight which their hand is to command lies chiefly in the back. B, the knife, in which there is nothing particular worth noting, excepting the shape of the point, which is made fit to divide the ligament between two bones, and this makes a catling knife needless. C, a turniket, made of the strongest cloth list, with a fence of leather for the limb in the place where it twists. This kind of turniket being substantial and soft, is the best that I have yet known for a single operation. But for armies and fleets Monsr. *Petit's* turniket is unquestionably the best, and is a most useful and excellent invention, as by a sufficient number of these any number of men may be secured from bleeding to death, till the surgeons can assist them in their turn.

PLATE VIII.

The CLUB-FOOT.

A, a limb distorted from the birth. B, the bandage to cure this distortion, which consists of several
several

OBSERVATIONS. 453

several pieces of linen rag dipt in a mixture of whites of eggs and flour. The first point to be gained in this cure, is to get the foot out straight with the leg, holding it in that posture till the bandage grows stiff; after this, by succeeding bandages, the foot may be brought into its proper situation. There is no bandage so equal as this for a fractured leg. I always use it, leaving that part upon the *tibia* very thin, that if it grows loose by the abatement of a swelling, I can cut out a piece, and bind it closer. Upon a journey, I once set the cubital bones of a gentleman's arm that was broke; and making use of this bandage, he, the two next days, rode long journeys without any inconvenience, and at the end of forty days took it off, and was perfectly well. For further directions relating to the use of this bandage, see *Chefelden's Anat.* p. 37.

T A B. IX.

A, THE adipose membrane in which the eye rests, which being much inflamed, this kind of tumor sometimes arises under the *tunica conjunctiva*, which membrane being divided by a knife all round the tumor, directing the incision towards the tumor, it may then be easily taken out by a pair of scissars. It is not at all necessary to take the whole tumor out, for what remains will subside from the bleeding and digestion; but if this operation is neglected, though the tumor frequently subsides, yet it leaves behind it an incurable blear-eye.

B, AN indurated tonsil, whose base being too wide to be tied by a single ligature, a needle with a double ligature being passed through, it

may be drawn through the mouth by a hook, then being divided, one ligature is to be tied on the lower side of the gland, and the other above, by the help of the instrument D, Tab. VI. which I first invented to tie a tumor *in utero*.

C, AN instrument to pull the gland forwards, and is also a good director for the needle; this operation, or the tying of the gland by one ligature, where it can be done, is always effectual. Mr. *Torr* informed me that an acquaintance of his, Mr. *Dunning*, an eminent surgeon of *Dorsetshire*, has many years last past cured these tumors by burning them through a canula.

T A B. X.

A, PART of a director passed under the tendinous part of the mastoid muscle, which is inserted into the sternum, being, as I apprehend, all that is necessary to be cut in the operation of the wry-neck, the thin muscular part of this muscle that is inserted into the clavicle, being capable of stretching after the operation. I have formerly divided the muscle near the middle, thinking it would answer better, the whole muscle being divided in that case (but I have altered my opinion).

B, A cancer'd breast, with so much of the skin marked with a line, as is necessary to be taken out with the cancer. C, the pectoral muscle, as it appears after the cancer is dissected out. The way of extirpating cancers in the manner here described, was introduced with us by a bold, and not very ignorant clergyman. He was universally rail'd at by the profession, which greatly helped on his reputation; but the

truth is, he extirpated with less loss of skin, took the tumors out more clearly, and then tyed up every vessel as he proceeded, and through ignorance, as they called it, dressed more simply than was the practice among surgeons; all which contributed to his success, which exceeded any thing that had been known before. But his operations were tedious, and the more learned following the same method, his reputation in a manner faded away. This way of operating is equally proper in all glandular and cystic tumors, the practice of the crucial incision in these cases being extremely barbarous; we have practised the same method in them, and in the extirpating a testicle. I have always used the like method, leaving a part of the skin upon the testicle, and not fleaing all the skin off the scrotum, and cutting away what was superfluous afterwards.

T A B. XI.

A, THE extensor carpi ulnaris, which goes under the ulna when the hand is turned prone. B, the ulna fractured alone. C, the radius. D, the radius. E, *ligamentum transversale cubiti*. F, the ulna. G, the extensor ulnaris. H, a fracture of the radius. The use of these two figures is to shew the different position of the extensor ulnaris, when the hand is turned prone or supine; when in the supine position (that is, with the palm of the hand upwards) this tendon then rides over the end of the ulna, which when that bone is fractured near the end of it presses downwards, and prevents its being well set; but when the hand is turned prone, the

456 O B S E R V A T I O N S.

same tendon lies partly under the ulna, and presses it into its proper place. H, a fracture of the radius, which is seldom set without the bones bending inwards, the reason of which I cannot comprehend.

T A B. XII.

A, THE operation of the aneurism, the artery tied by two ligatures. B, part of the sac of the aneurism. C, the orifice into the artery. D, the orifice, it being in the humeral artery. E, a section of part of the artery. F, a section of part of the aneurism. The membrane which makes the sac, and the inner coat of the artery, appear as much the same as if they were originally formed together, which has made authors conclude, that the outer coats of the artery only were wounded, and that the inner one was protruded through the orifice, and then extended; this indeed accounts for the sameness of the inner membrane of the sac, and the inner coat of the artery. But how little reflection will show the absurdity of this! For can it be supposed, that once in a thousand times, the external coats of the artery should be divided, and the internal not wounded? but the issuing out of the blood at the time of the operation of bleeding, is a proof of the contrary. I have always thought that it was a communicant artery that was wounded in bleeding, supposing there was no other way of accounting for the sudden reflux of blood after tying the first ligature; or that the wound was made in the inferior cubital artery, and then it was accounted for by the communication of the two cubital arteries in the palm of the
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the hand; thus satisfied, I enquired no farther, though Mr. *Sharp*, even so long since, as when he was my apprentice, told me, the wound was in the humeral artery, as indeed it is. The so sudden reflux of the arterial blood shows how great a communication there is in the minute arteries; it also persuades me of the truth of what I have been told by an eminent surgeon; that he had even performed the same operation with success in the middle of the arm, on men that had been wounded in battle, and that the limbs perfectly recovered; but I own I did not then believe it.

T A B. XIII.

A, a knife, which we use in all operations, much to be preferred to the bistory, which can never have a good edge and a strong point.

B, a couching needle, one part of the handle black, which I ordered for the first operation I performed, foreseeing, that it might be useful to show me what position the needle was in, in the eye. C, a crooked needle, sufficient to take up the largest vessel in a limb. D, the eye of the same needle. E, the ligature. The needle should always be passed as close to the artery as may be, and not take much flesh; for taking in too much, when that flesh begins to be divided by the ligature, it will grow loose, and the artery bleed again. F, an instrument convenient to lift up the end of any small artery to be tied, that lies in loose membranous parts.

T A B. XIV.

A, A trocar of the largest size, which is necessary for performing the operation of tapping where the matter is viscid, but one a degree less is better for common use; the holes should be oval and well polished; but if the navel starts, the best way of discharging the water from the abdomen is by a puncture with a lancet. A small instrument of the same sort is often used in the hernia aquosa, but that having often had very mischievous effects, I would recommend the operation to be performed with a lancet, which being withdrawn before the water, can never be attended with any inconvenience. Doing this operation with a trocar has indeed more the air of a surgical operation, but the lancet in every respect is better for the patient; the trocar is sometimes used above the *os pubis* in a suppression of urine, which is subject to this inconvenience; after the trocar is withdrawn, the water finding more easy passage through the bladder, than it can through the integuments of the abdomen, and the orifice of the bladder receding from the orifice in the integuments of the abdomen; as the bladder empties, the urine will lodge between the bladder and those integuments, and if the canula is continued in the bladder I should expect no less pain than in a fit of the stone. However, I don't pretend to decide in this matter, but an incision about an inch long through the integuments of the abdomen above the *os pubis*, and about half an inch long in the bladder (which I have often performed) is not attended with these inconveniences; and surely pain, which always
causes

OBSERVATIONS. 459

causes inflammation, should as much as possible be avoided in this case. But before any operation is to be performed, it may not be amiss, to consider what should first be attempted in this case. I have found, as I suppose, a stoppage created by nothing but a little mucous matter in the urethra; and upon injecting warm water hastily down the urethra, the obstruction has been removed. Where this has failed, bleeding very plentifully, even till the patient faints, and afterwards repeating of it, if necessary, and purging incessantly with *sal. cath. am. vel Glaub.* which are very quick in their operation (for there is no time to be lost) has generally taken off the inflammation, and made an operation needless. Bathing, and even opiate clysters, from the best observations I have been able to make, appear to me of very little use in this case.

B, THE end of a female catheter. C, a stilet. D D, a male catheter, which should be thicker at the end, but not so much as in this figure; and the holes in the catheter should be perfectly polished. E, a rag put upon the end of the catheter when it is used to draw off urine: one end being put into the vessel which receives the urine (when the stream grows weak) directs it into the vessel.

T A B. XV.

[To a scale of three inches.]

A, A gorget six inches long besides the handle. B, the forceps twelve inches long, and about twelve ounces weight. C, one of the blades

460 O B S E R V A T I O N S.

blades of the forceps. This pair of forceps, with others of eleven, ten, and nine inches, are all that I have used: that of nine inches weighing four ounces, and the chops coming much closer together, but are not to be used in extracting a large stone; the small gorget not above four inches long besides the handle.

T A B. XVI.

A, a staff nine inches long directly from one extreme to another. B, the end of that staff expressed somewhat too large. C, the end of a gorget. D, a gorget. The forceps which they used when I first began to cut, were short, and with large teeth, which often broke the stone. The staff and gorget were made of silver, and the end of the staff with a stop to it; and being made of silver, the friction against one another were not well discerned, and the stop at the end was often the occasion of the gorget's not getting into the bladder, which in the consequence was death to the patient.

T A B. XVII.

A PAIR of polypus forceps. B B, the chops of the forceps, the external hole of which ought to be well polished. C, a pair of scissars with blunt points, very useful in surgery.

T A B. XVIII.

A, THE fore-finger amputated with the skin enough to cover the bone. B, the finger taken off.

OBSERVATIONS. 461

off. C, the great toe taken off with the skin very much preserved. D, the end of the *os cuneiforme* where it was joined.

T A B. XIX.

A, a limb on which the first part of an amputation is performed. B, C, a mark on the muscles, where the cutis and *membrana adiposa* were divided; the next incision is to be made close to the skin, next the knee down to the bone. D, the amputation completed. E, Tibia, F, Fibula. The operation being thus far performed, every vessel is to be tied with as little flesh included in the ligature as may be. The first part of the dressing should be a digestive or lint dipt in oil, that it may come off again easily; then the whole cavity must be filled up with lint, and particular care must be taken, that the external skin may not lie over the tibia; then the stump must be comprized in a loose knit cap, and gently rolled. G, the appearance of the stump after it is cured, which having but a small scar, was easily healed, the bones never needing an exfoliation, nor is it so liable to break out again. The thing that led me to do this operation was what has too often happened, the necessity of cutting off the end of a stump the second time. This operation I proposed to my master, when I was his apprentice, but he treated it with neglect, though he lived afterwards to practise it, when he had seen me perform it in the same hospital.

T A B.

T A B. XX.

A, a section of the intestinum rectum. B, an abscess, which at least is the first state of the fistula in ano. C, that part of the gut, which appears externally. D, the buttock. E, a section of the intestinum rectum. F, an abscess, which at least is the first state of the fistula in ano. G, that part of the gut which is external. H, the buttock. I, one of the blades of the polypus forceps, introduced into the fistula, it being first dilated with a sponge tent, the other blade being introduced into the anus, and then firmly holding so much as you would chuse to cut out, make use of the scissars, Tab. XVII. K. I formerly cut out a pyramidal piece in the manner here described, but I find this way with the forceps much more convenient, and more easy to be executed. The operation being thus performed, I have never found wanting a second cutting; and if, after this operation, there is an internal discharge into the gut, it may be an useful issue, and continue the benefit which nature designed by this disease. We should be very careful not to perform this operation when the patient is troubled with the piles, for I have known one in that case bleed to death.

FORMERLY I have taken off piles by incision; till I had a patient, who after this operation bled so excessively, that I was forced to attend him night and day to stop the bleeding as often as he went to stool. From that time I always tied these tumors with a ligature, which I find the best method of cure, and attended with no inconvenience. As soon as the pile is tied, it must be returned into the gut.

T A B.

T A B. XXI.

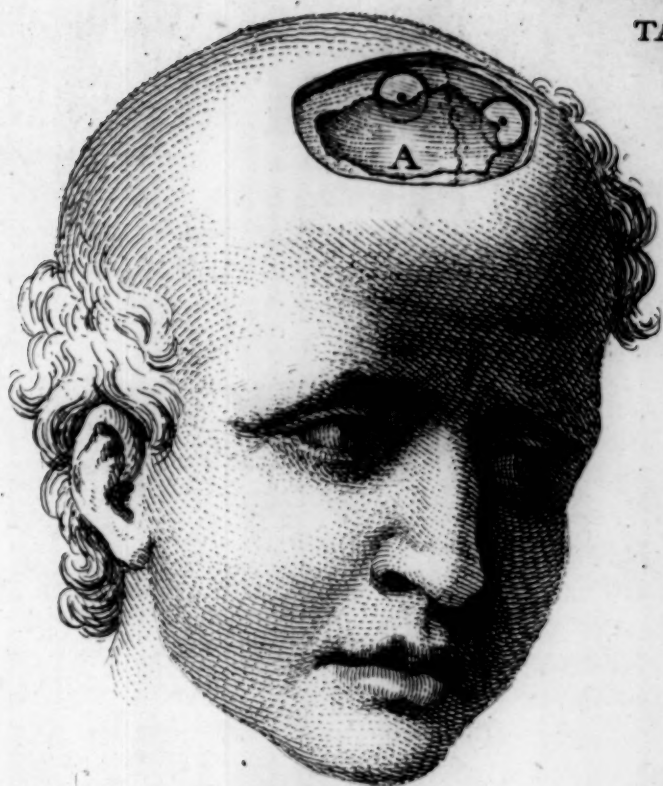
A PART of the peritonæum. B, the sac of the hernia intestinalis, extended as far as the testicle. C, the testicle inclosed in its tunica vaginalis. D, part of the peritonæum. E, the sac of the hernia intestinalis, which had communicated itself to the testicle. F, the line where it broke into the *tunica vaginalis testis*. G, the testicle; in both these cases the spermatic cord lies without side of the sac, which is a sufficient proof that the gut did not descend with the spermatic cord into the *processus vaginalis*. I had this account of herniæ first from the late Dr. *Douglas*, a most industrious anatomist, very communicative, and much to be relied on, who was very clear, they did not descend with the spermatic cord, but from the appearance, thought that the whole was a production of the peritonæum. The present cases I have from Mr. *Hunter*, a pupil of his, who dissected many of those which were shewn me by the doctor, and who, to all the good qualities of his great master, has added that of true philosophy. For my own part, I suppose this sac is formed, as the sac is in an aneurism, and in cystic tumors, where they are not found in either cases, while they are recent. H, an explanation of the lunated and transverse incision, as made in *Celsus's* operation for the stone, which I have described in my book of anatomy, and which by some was not rightly understood.

I PERFORMED the operation for the hernia intestinalis, upon a gentleman of sixty years of age, some years since, who had laboured for twelve years

years under a large hernia intestinalis, which often returned, but at length being strangled, I performed the operation. The sac was very large and thick: I cut away the greatest part of it, with part of the scrotum; after the gut was reduced, I took up with a ligature the whole sac close to the abdominal muscles, which made a perfect cure. He lived many years after without any damage to the testicle; which I think sufficiently proves that the spermatic cord was on the outside of the sac.

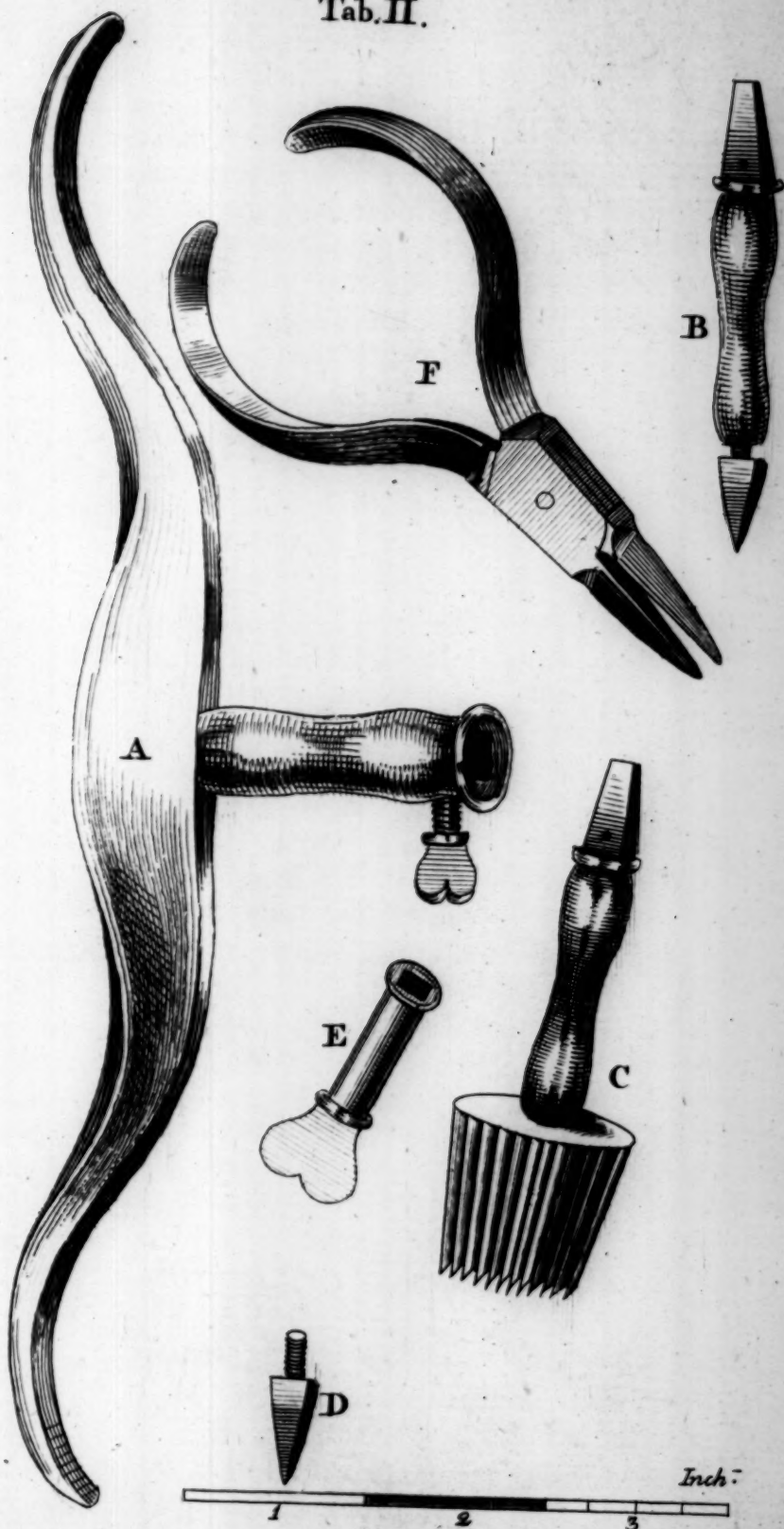
I ATTENDED a patient of a very eminent surgeon, who had a rupture of the largest size for many years, which always returned into the abdomen when he lay on his back. This gentleman applied a large caustic, about three inches long and two wide, directly upon the part where the gut descended, and this not going deep enough, when the eschar came off he applied escharotic powders till they consumed one half of the sac, and then healing from the bottom made a perfect cure. This is the way that so many quacks have pretended to cure ruptures, and have so seldom succeeded, not knowing that it is all in vain unless the sac is opened, and an incision made from the bottom. But surely this would be done much more easily by a knife than a caustic, taking out about three inches of the skin in length, and two in breadth, with the *membrana adiposa*, and about half the sac; and then healing from the bottom.

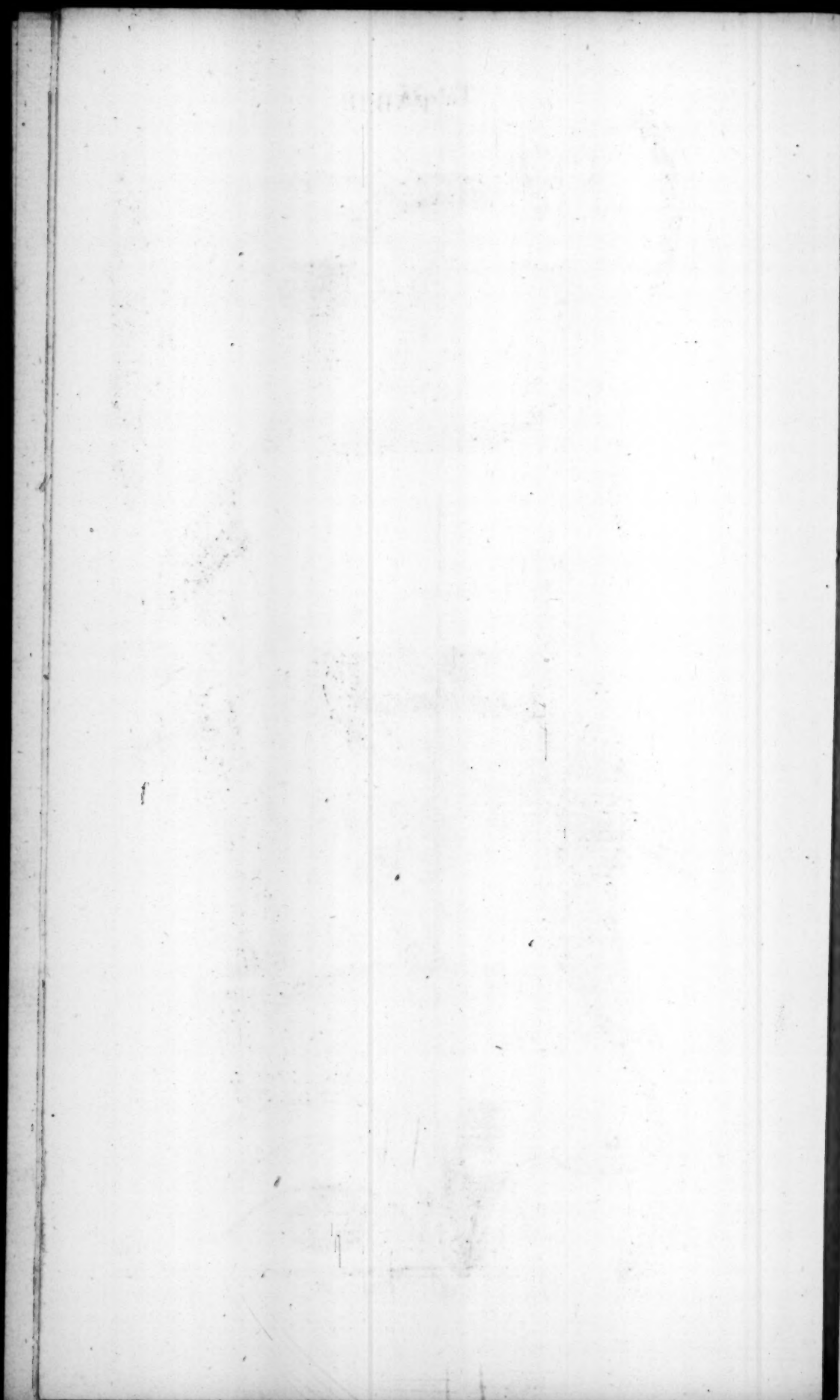
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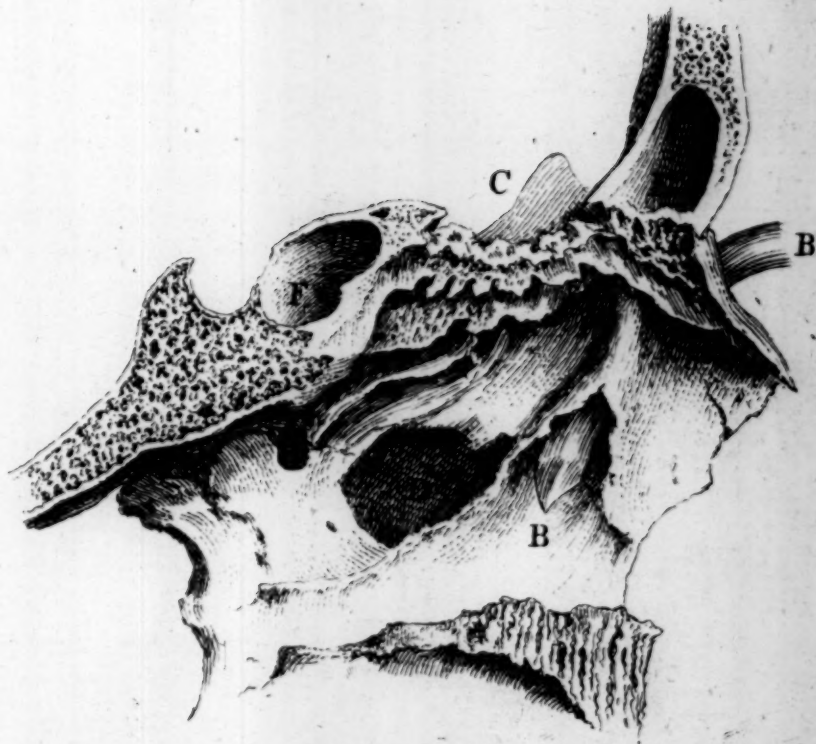
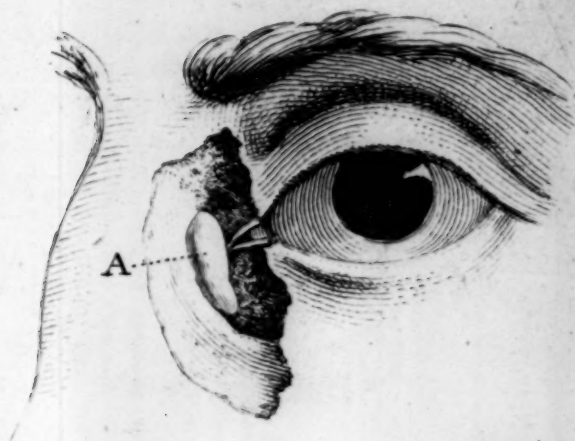
Tab 19

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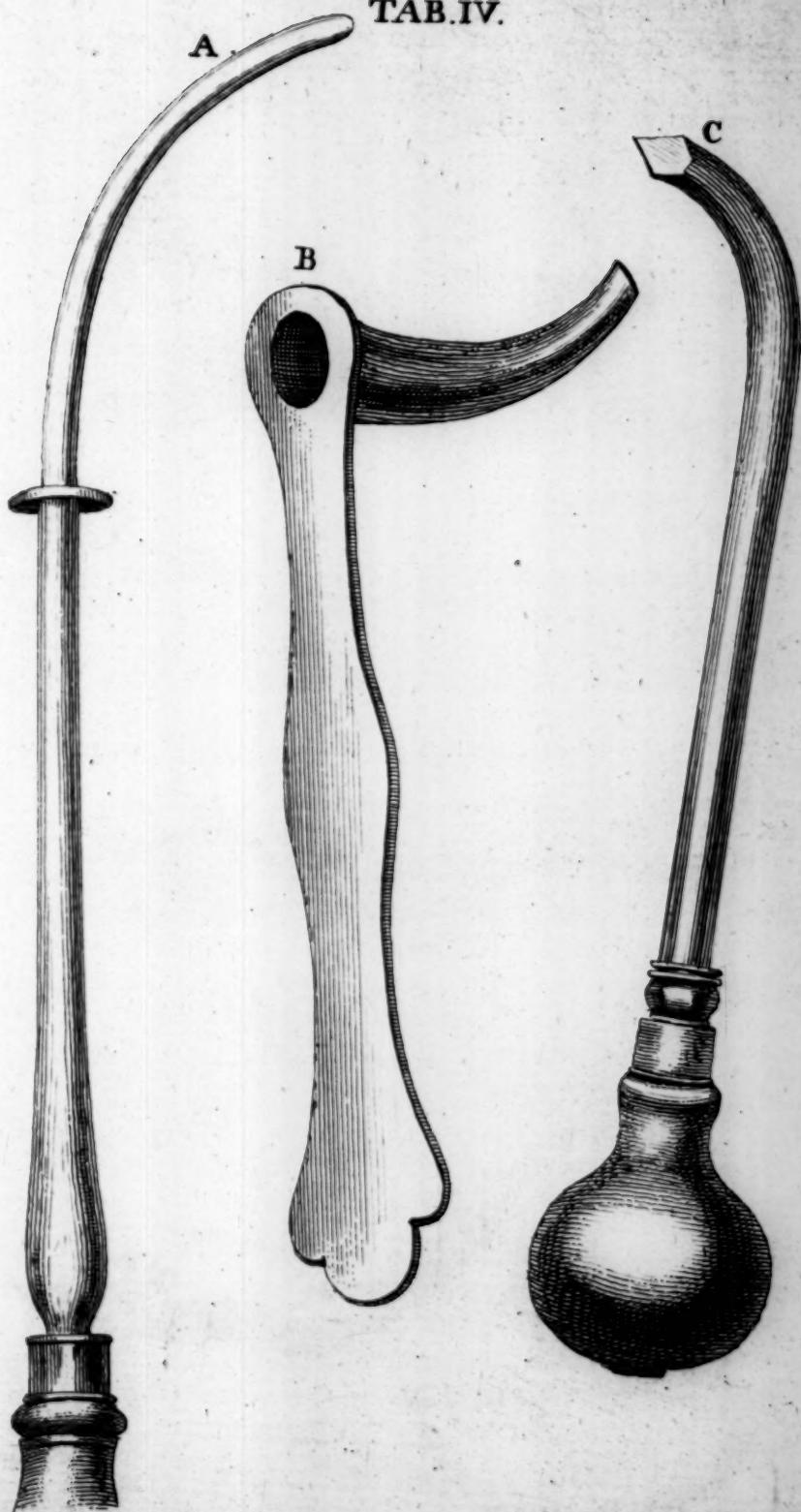


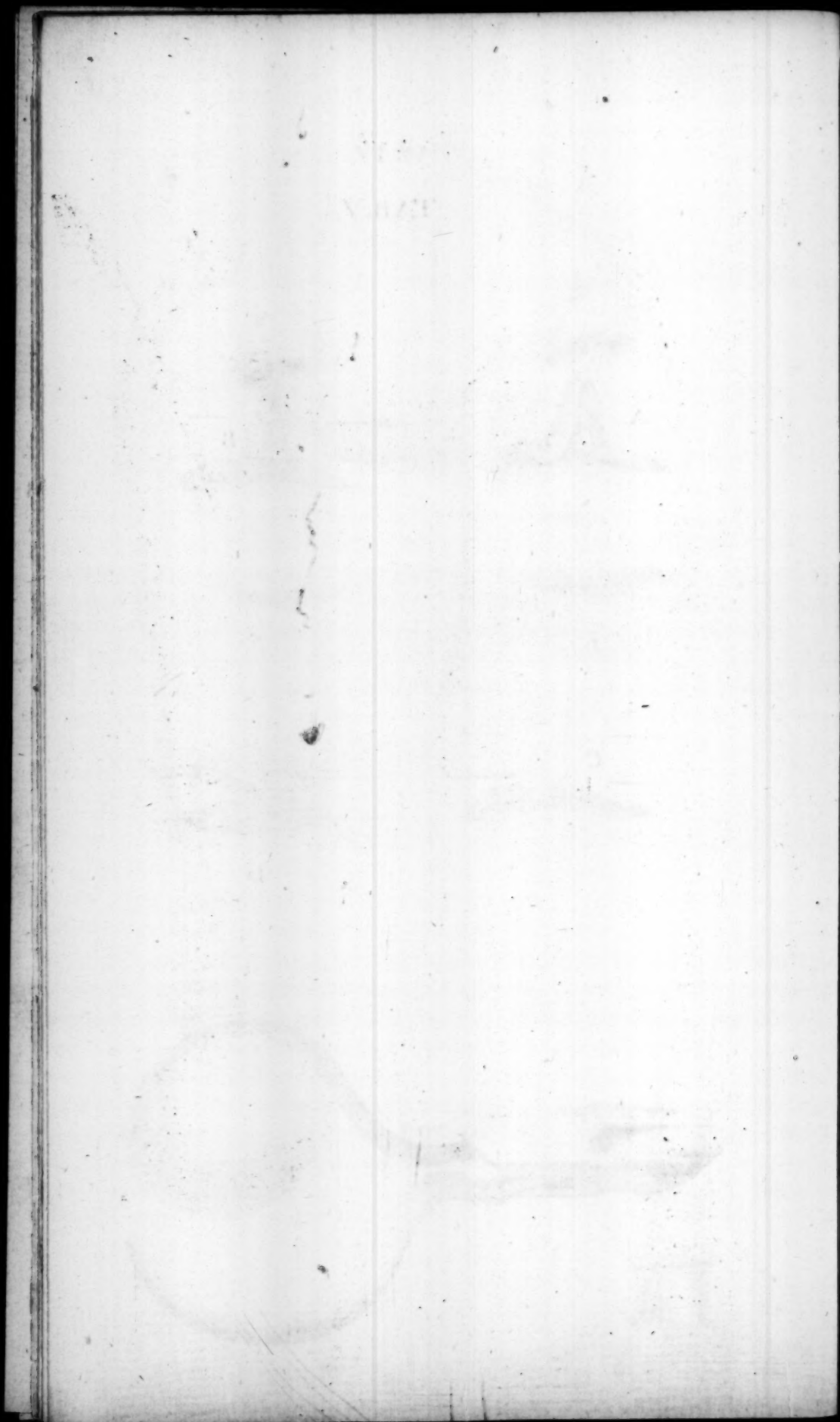
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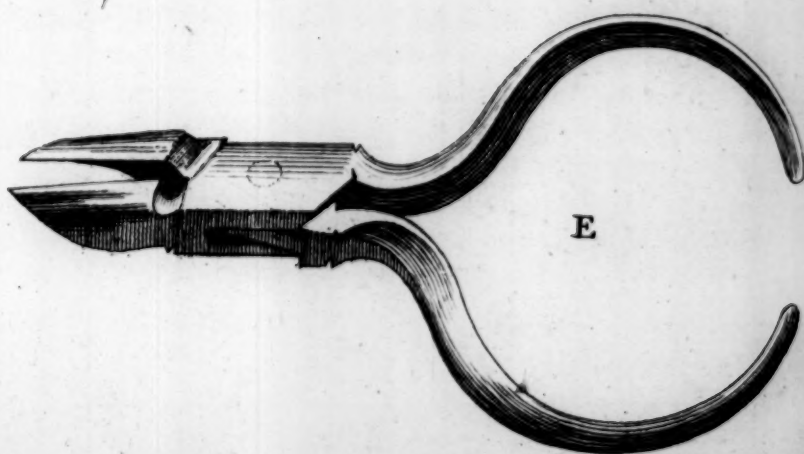
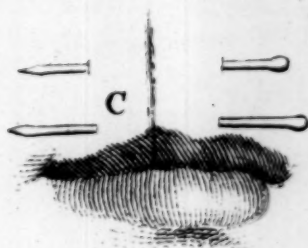
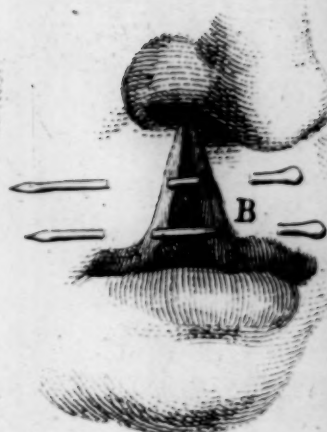
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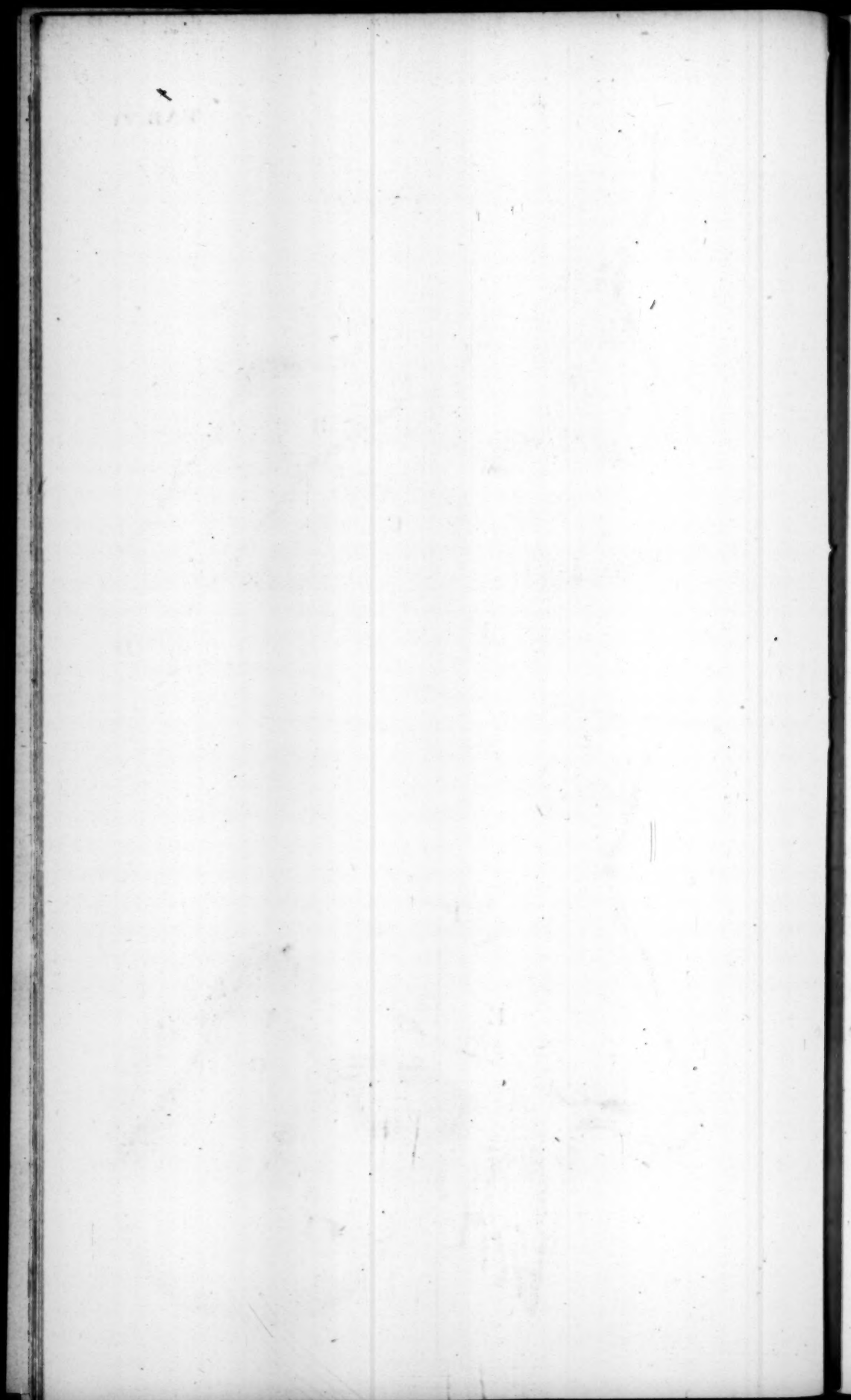
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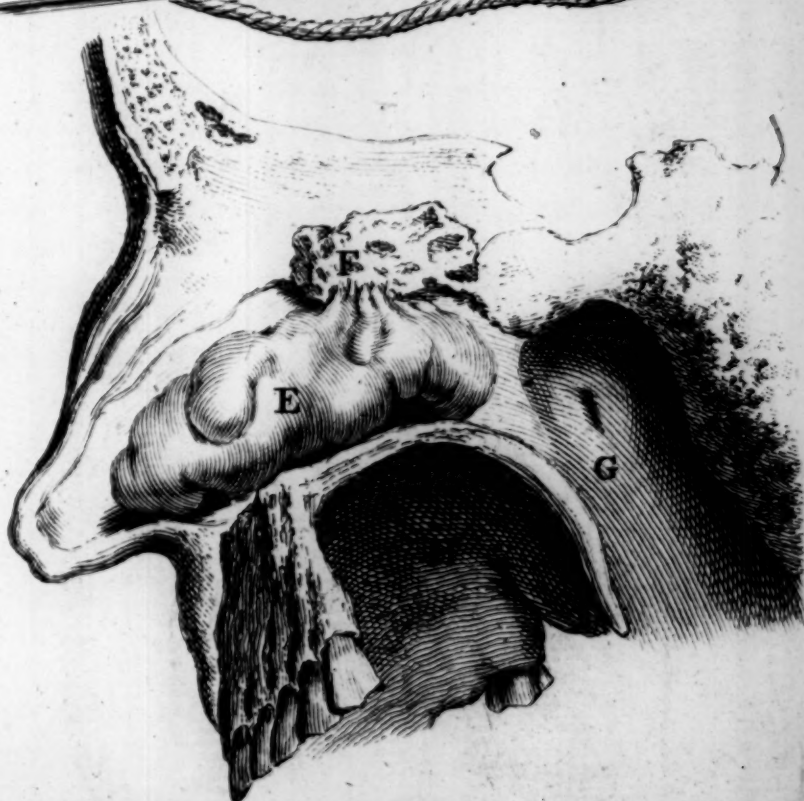
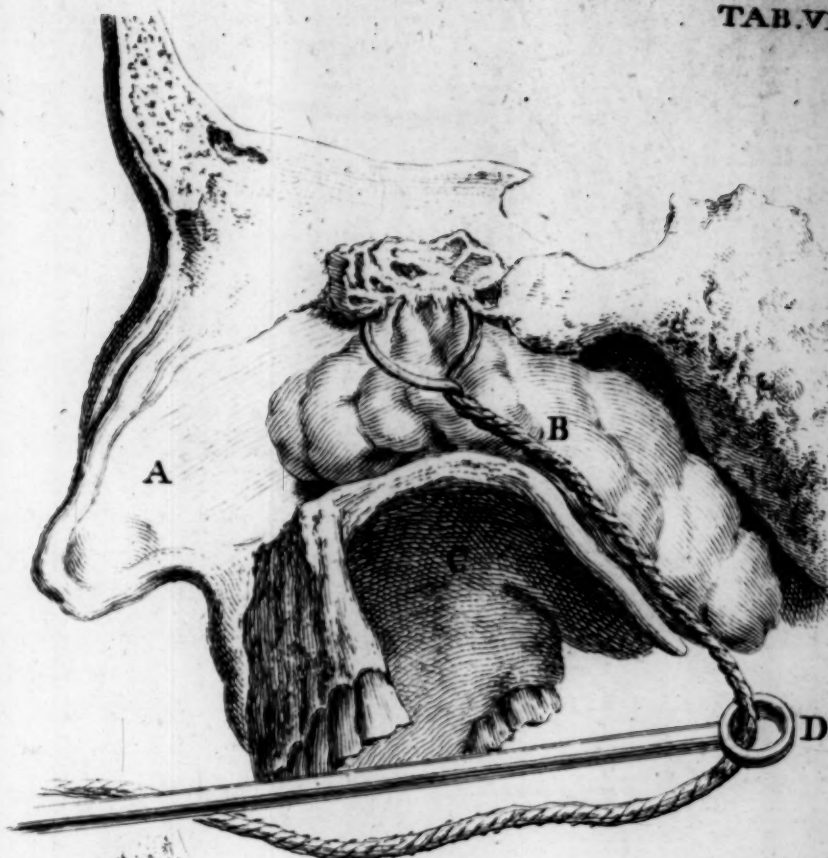


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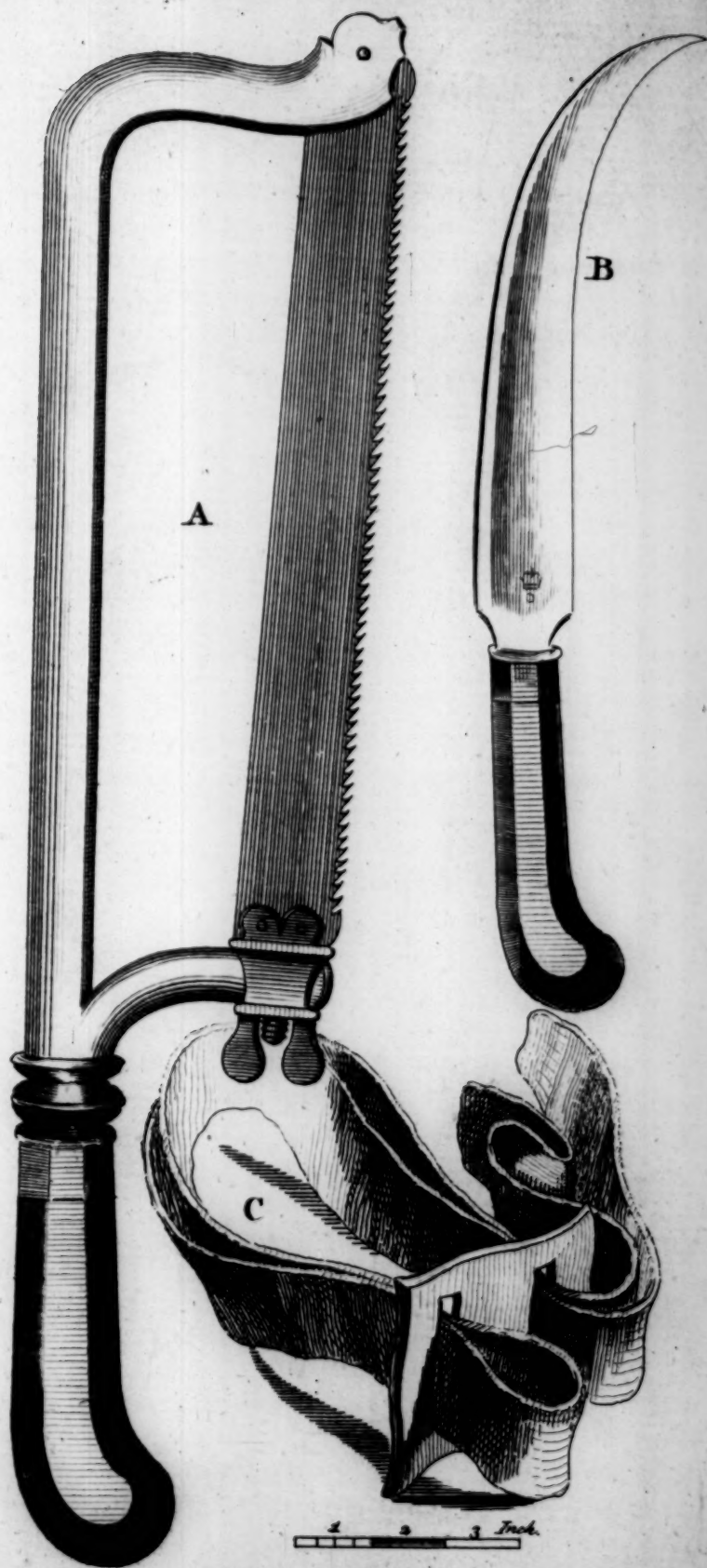


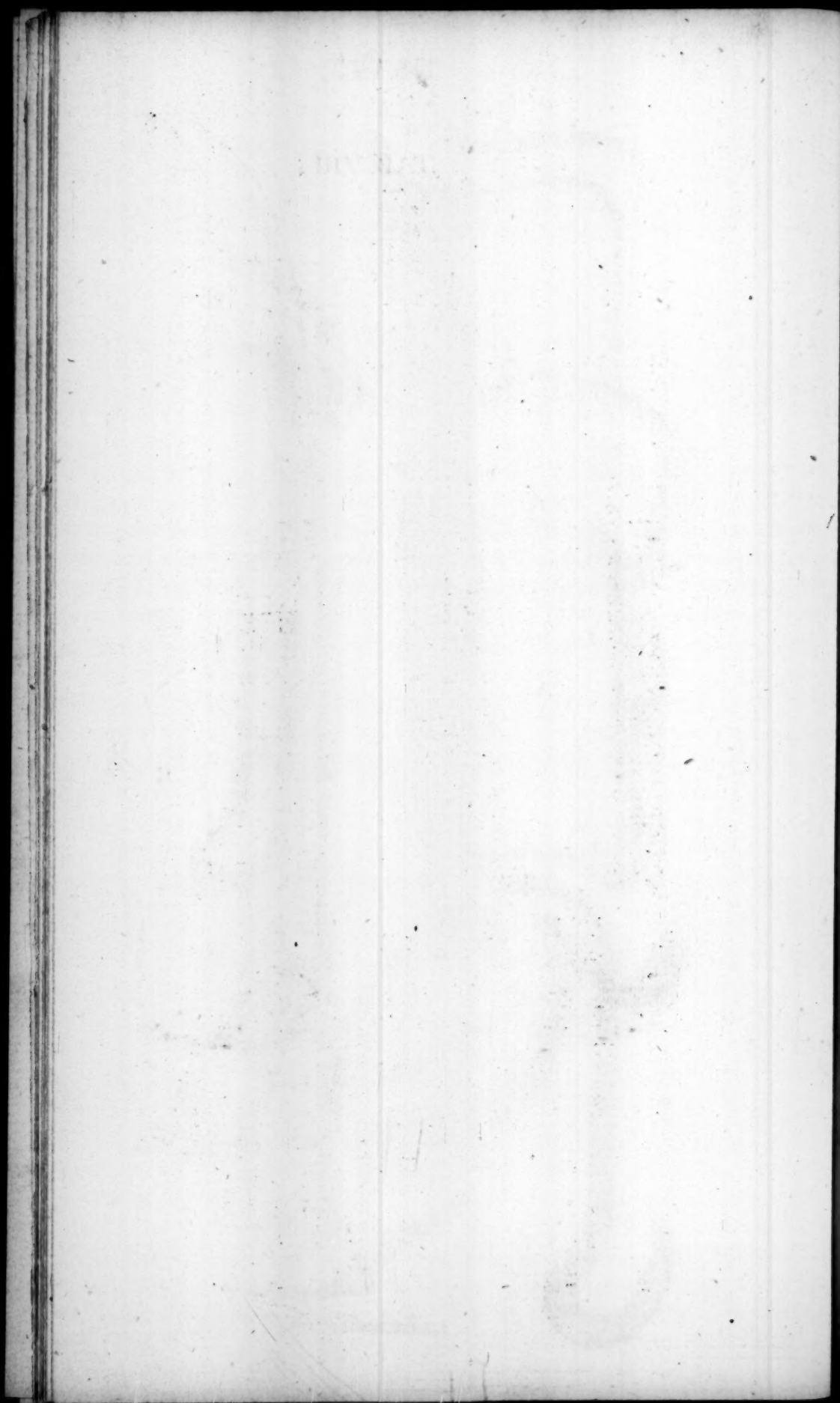


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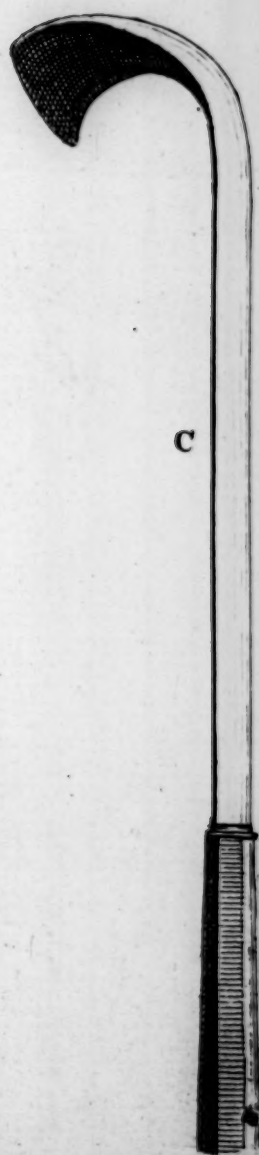
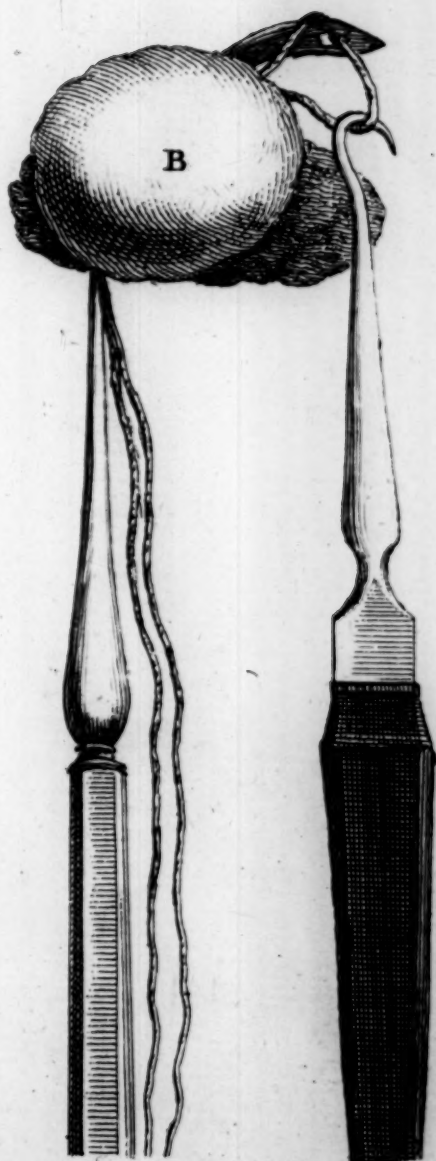


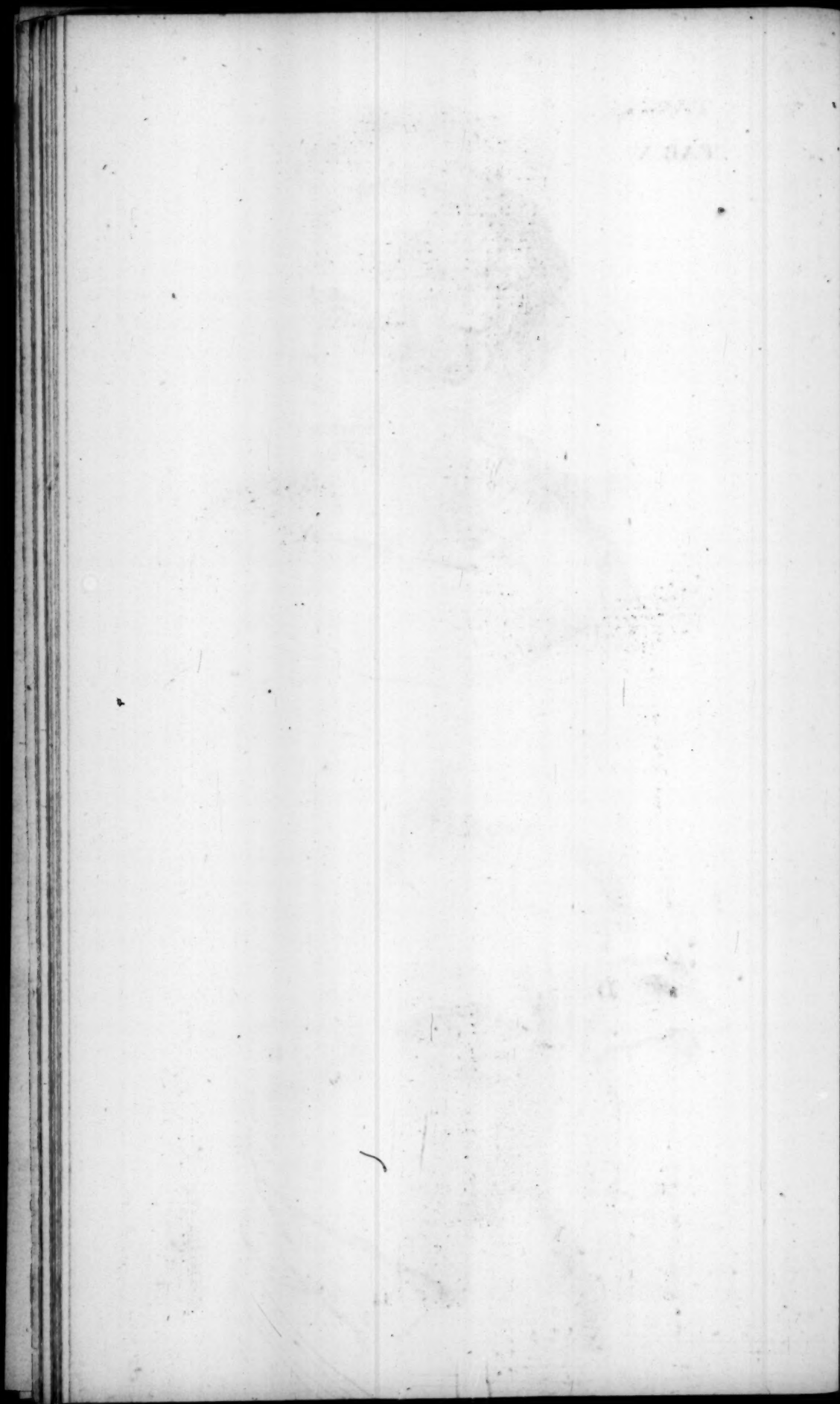
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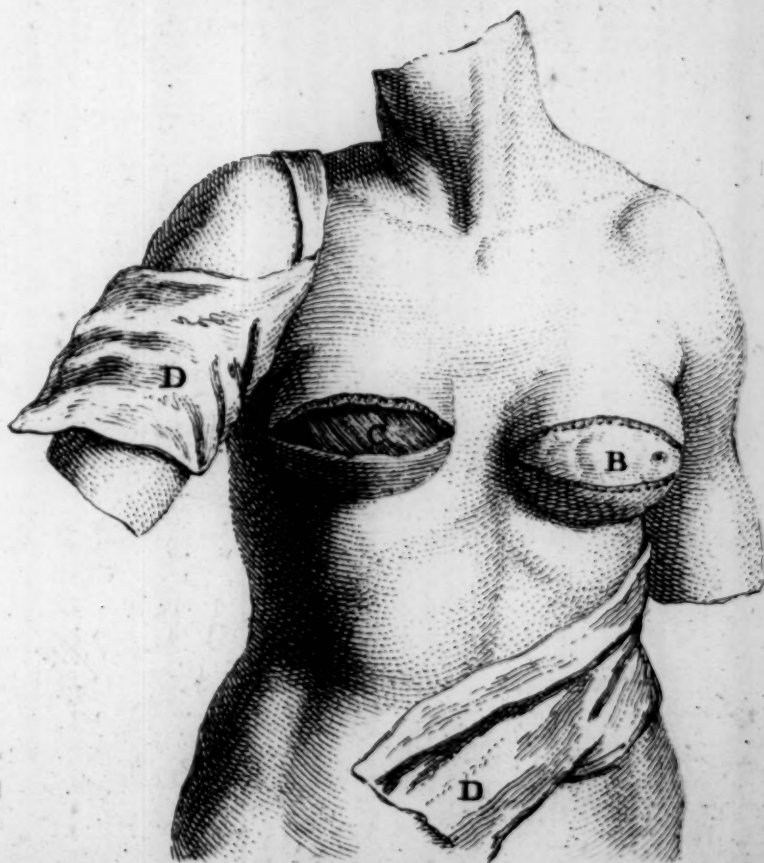
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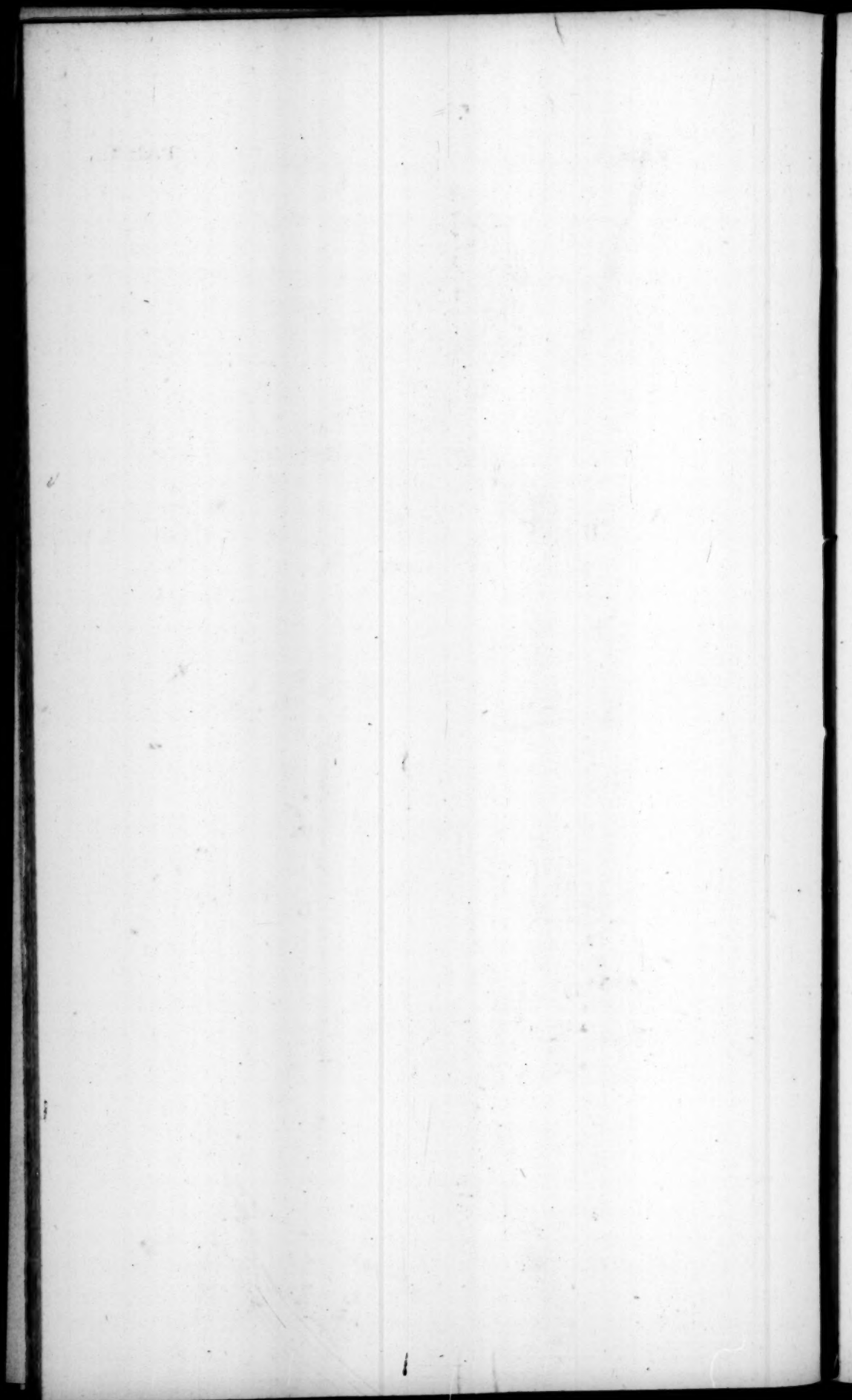
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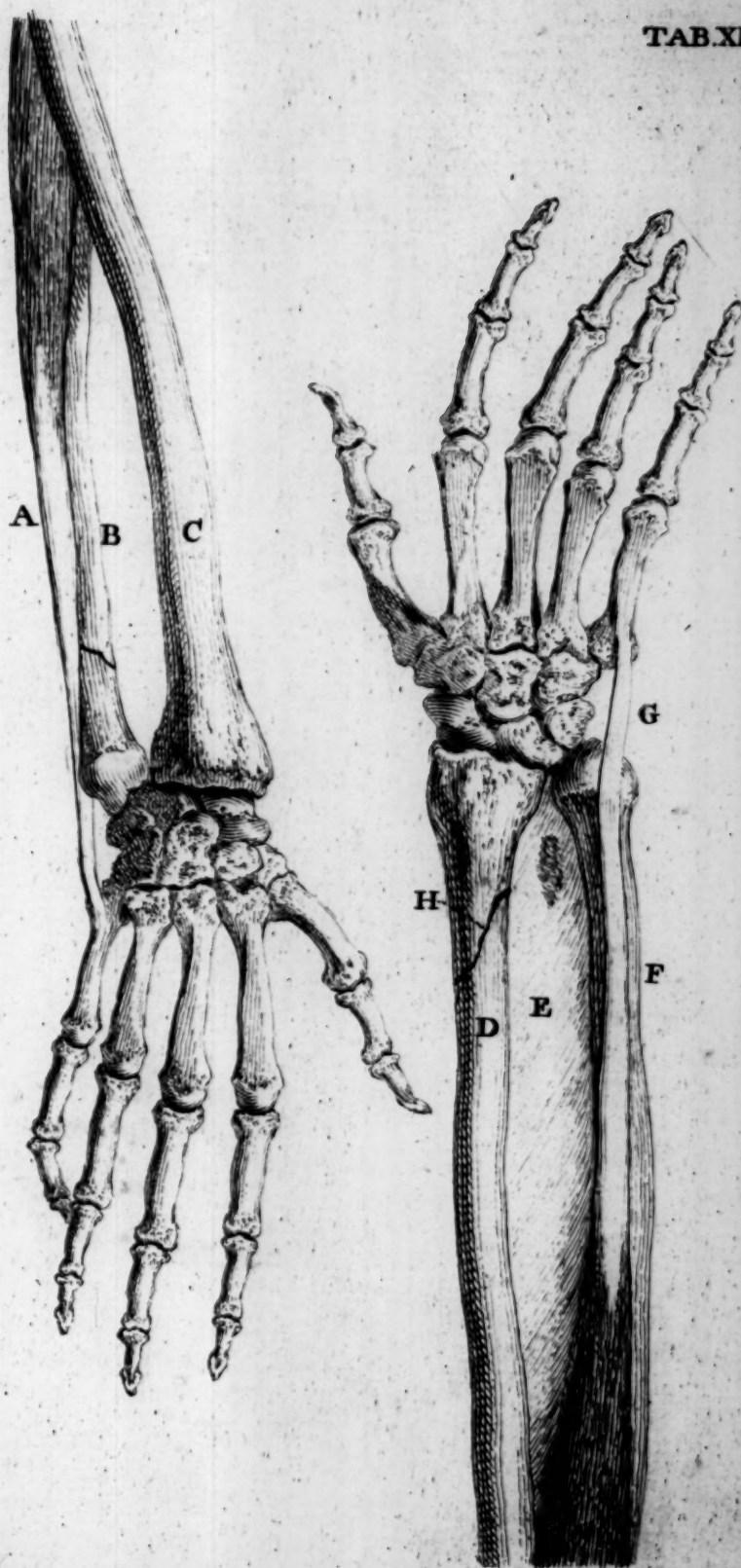


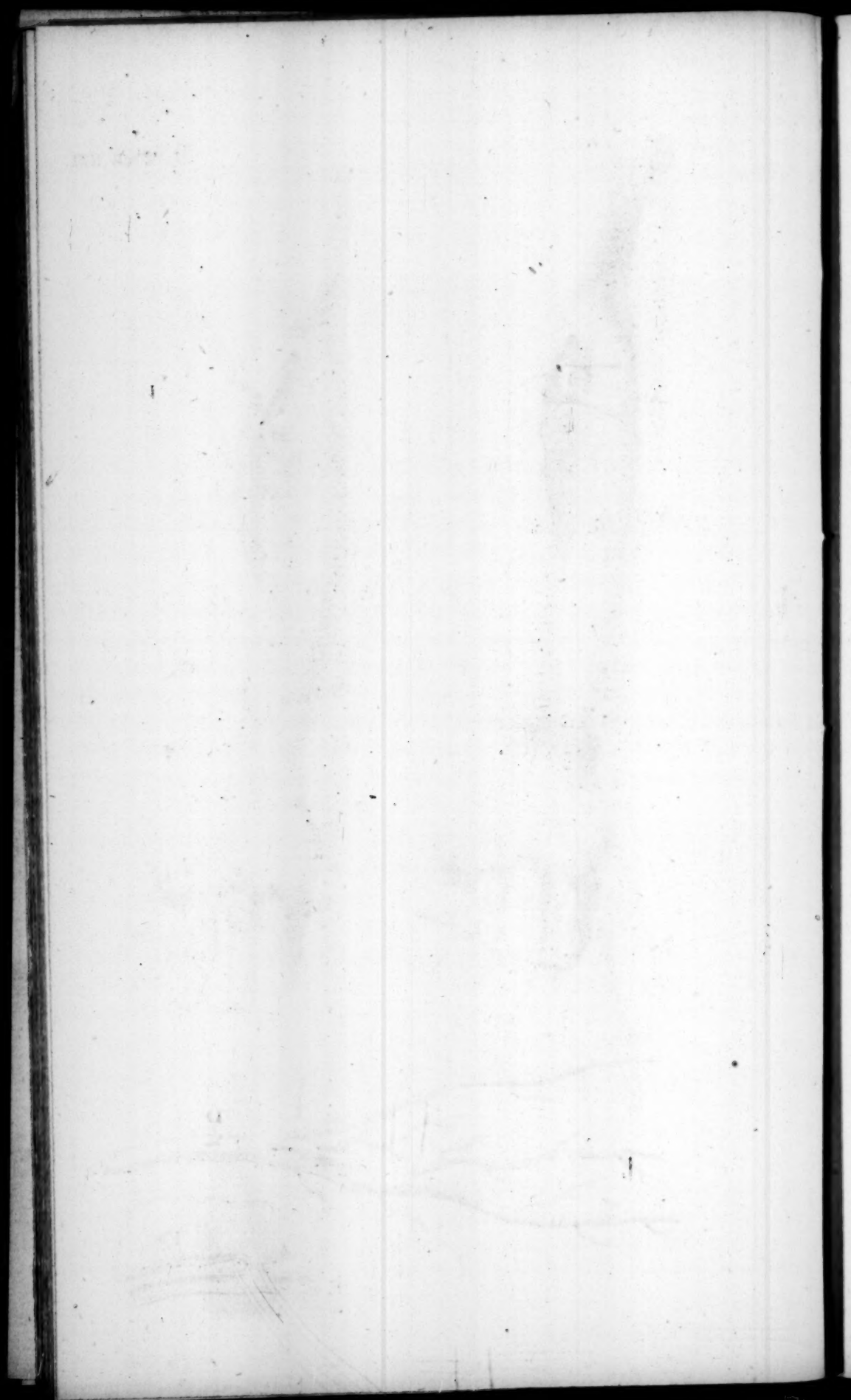
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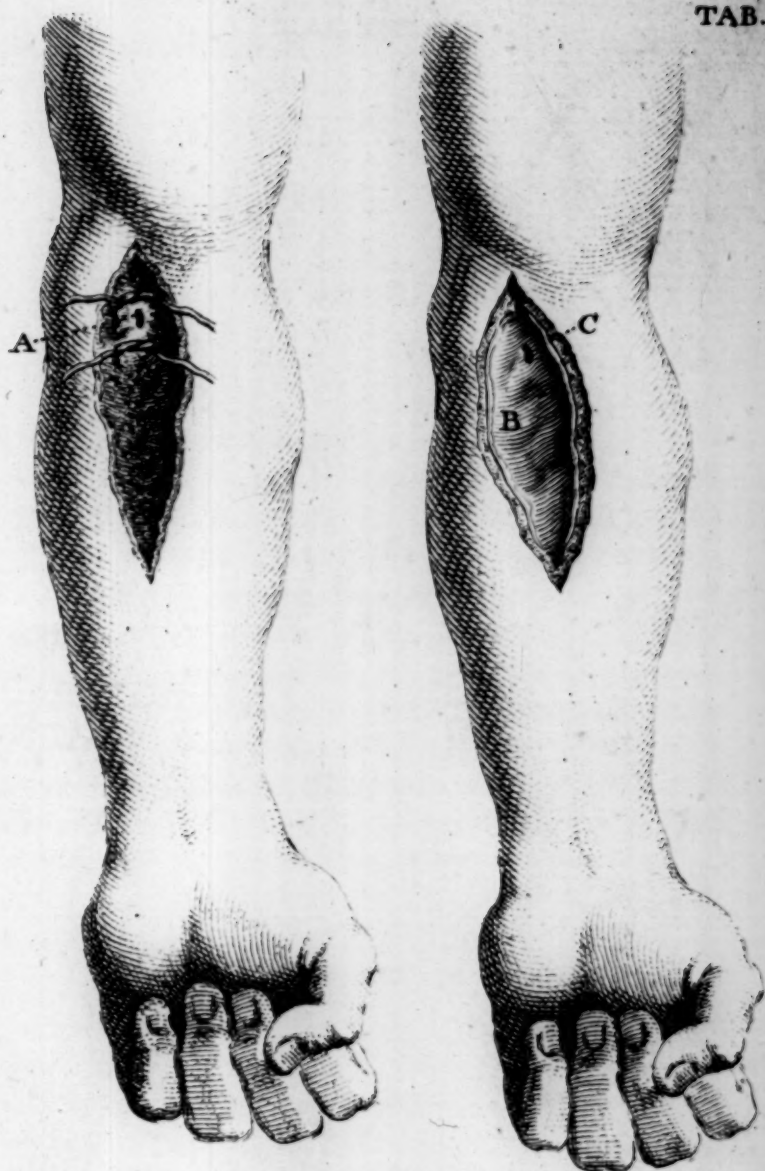




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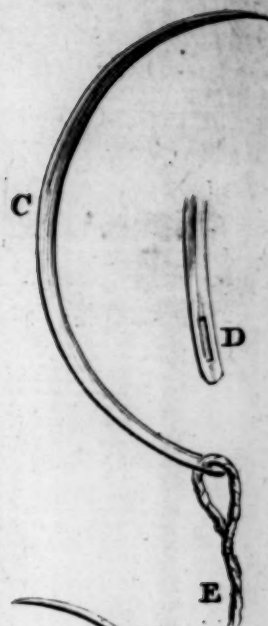
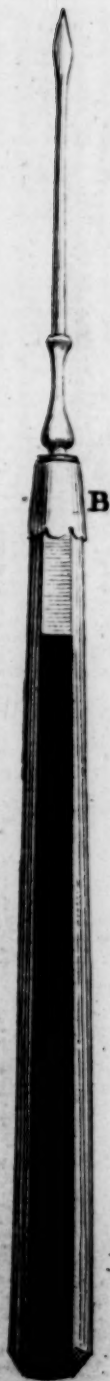




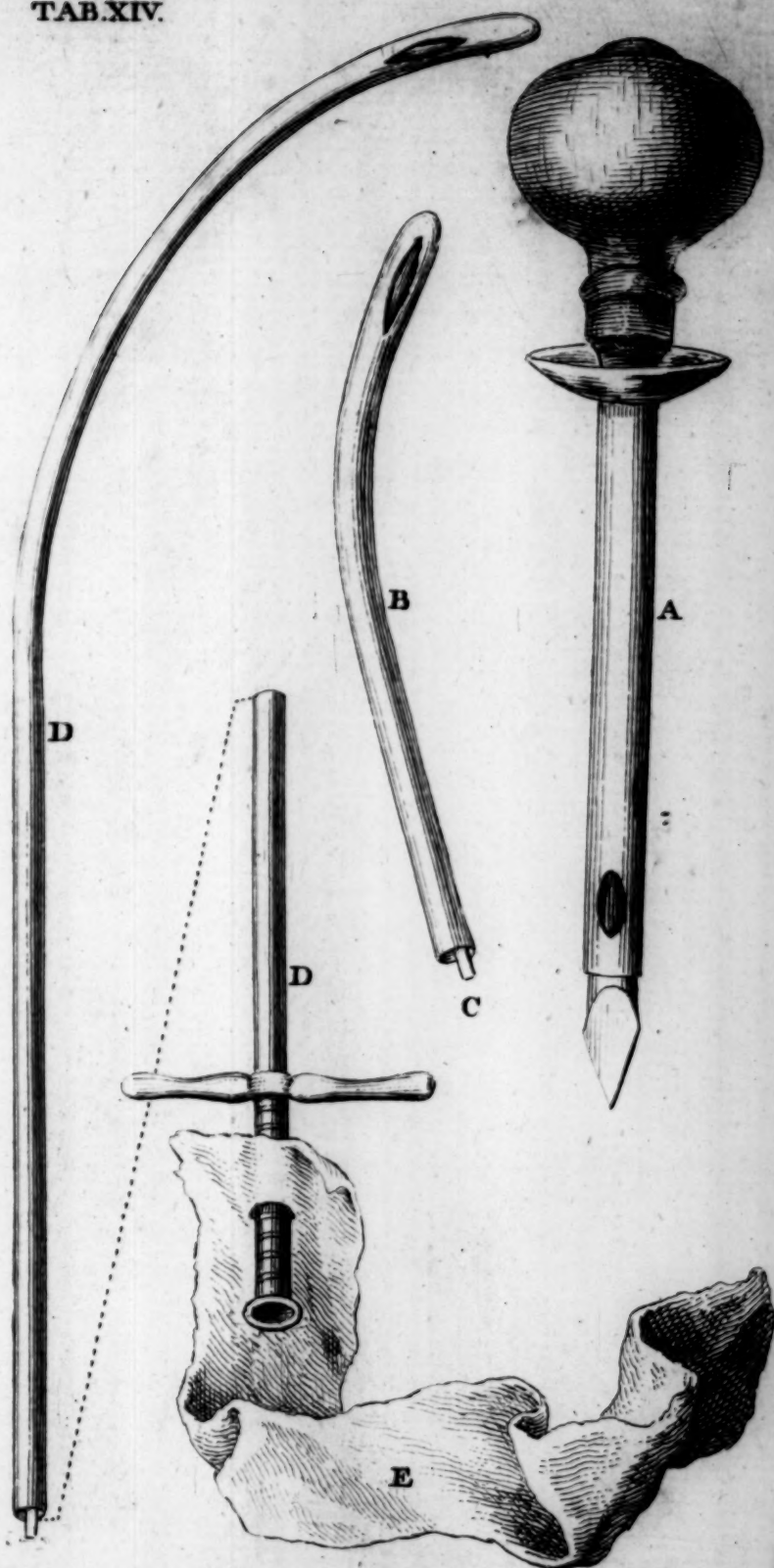


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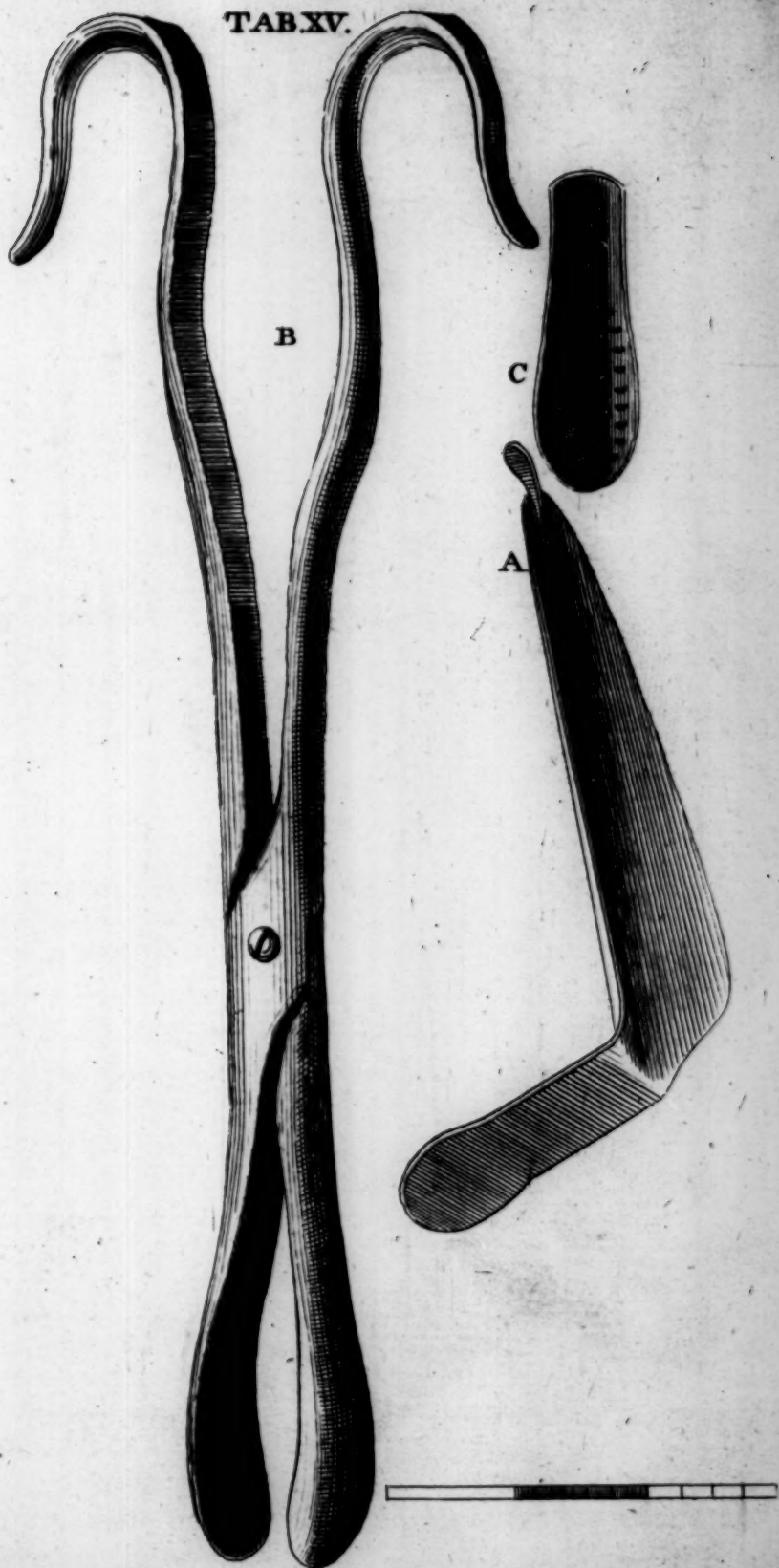


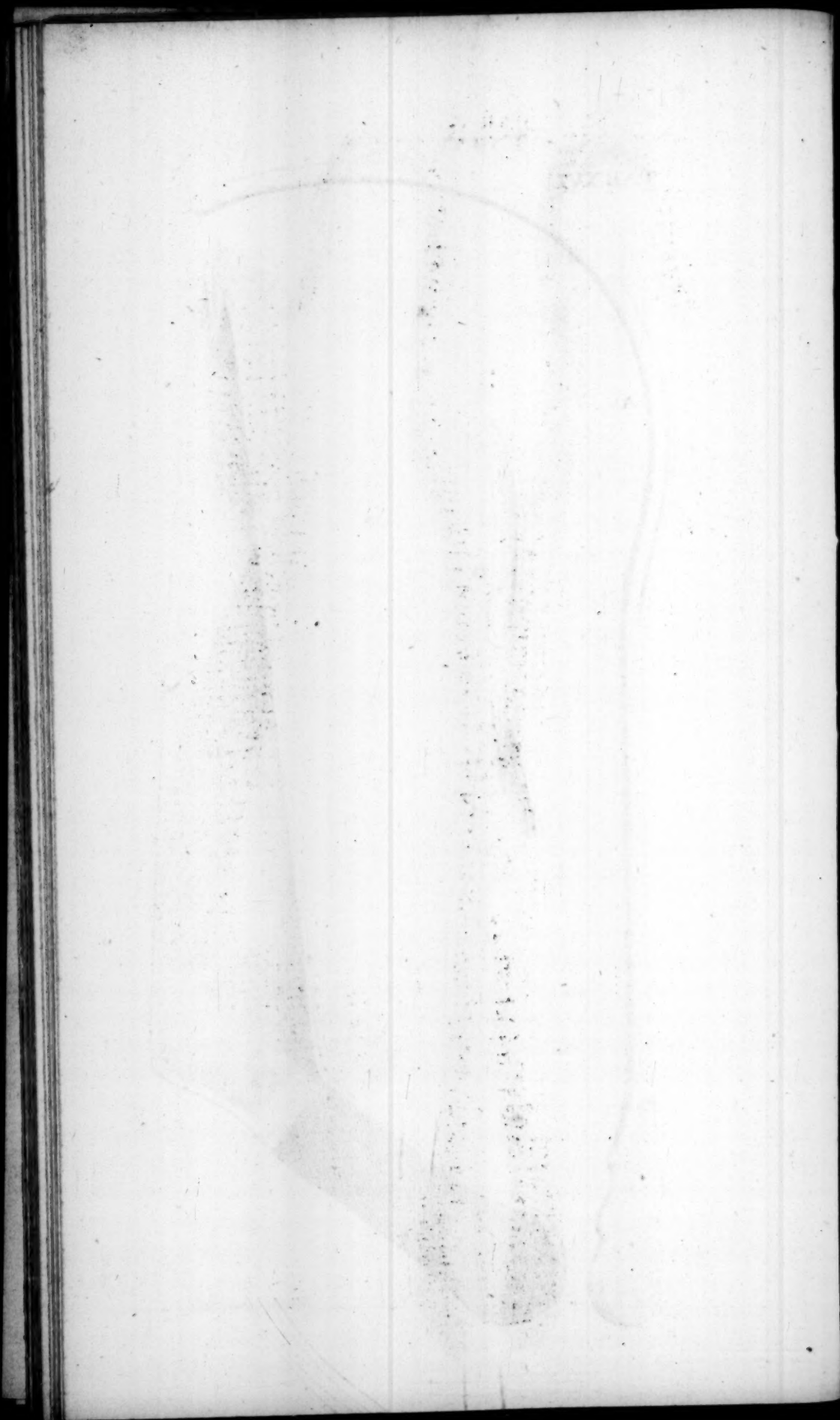
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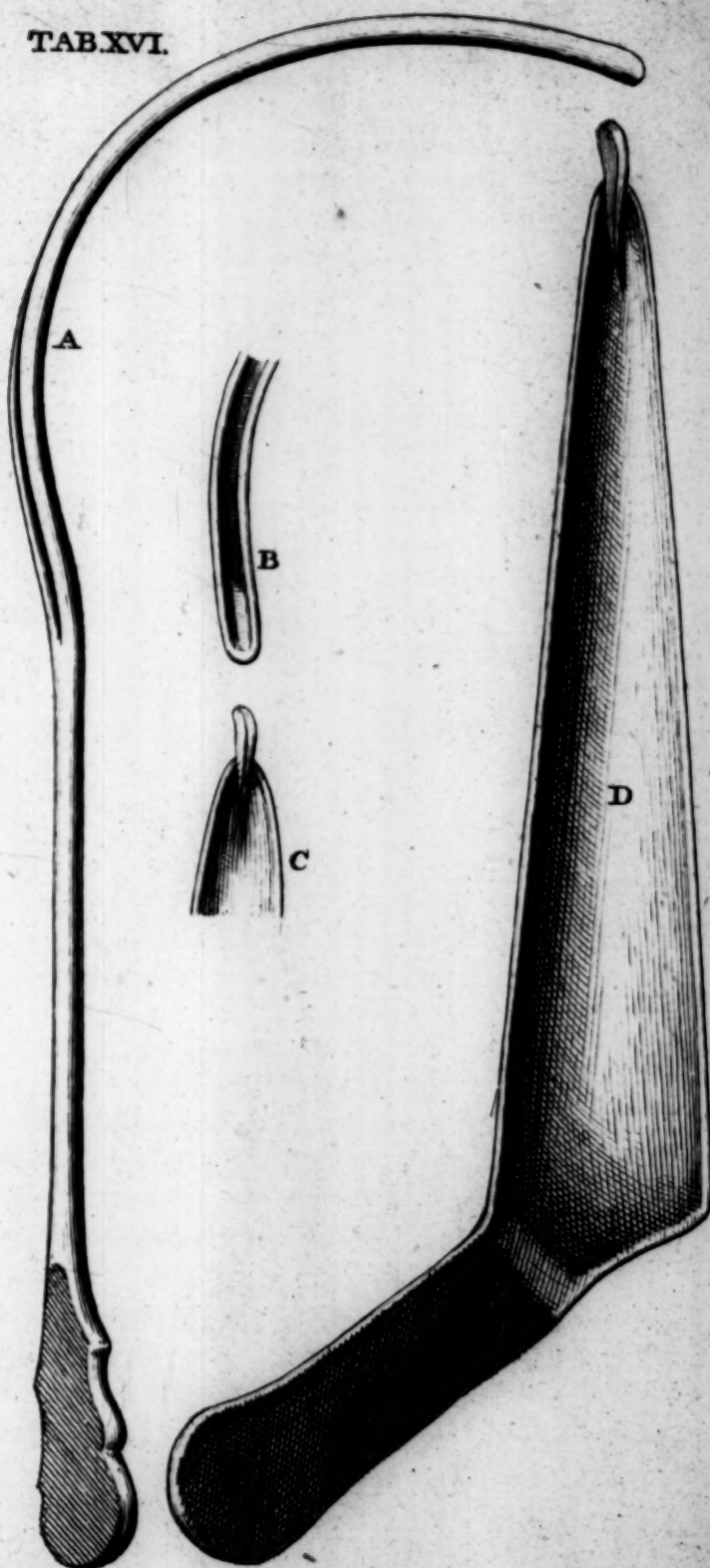
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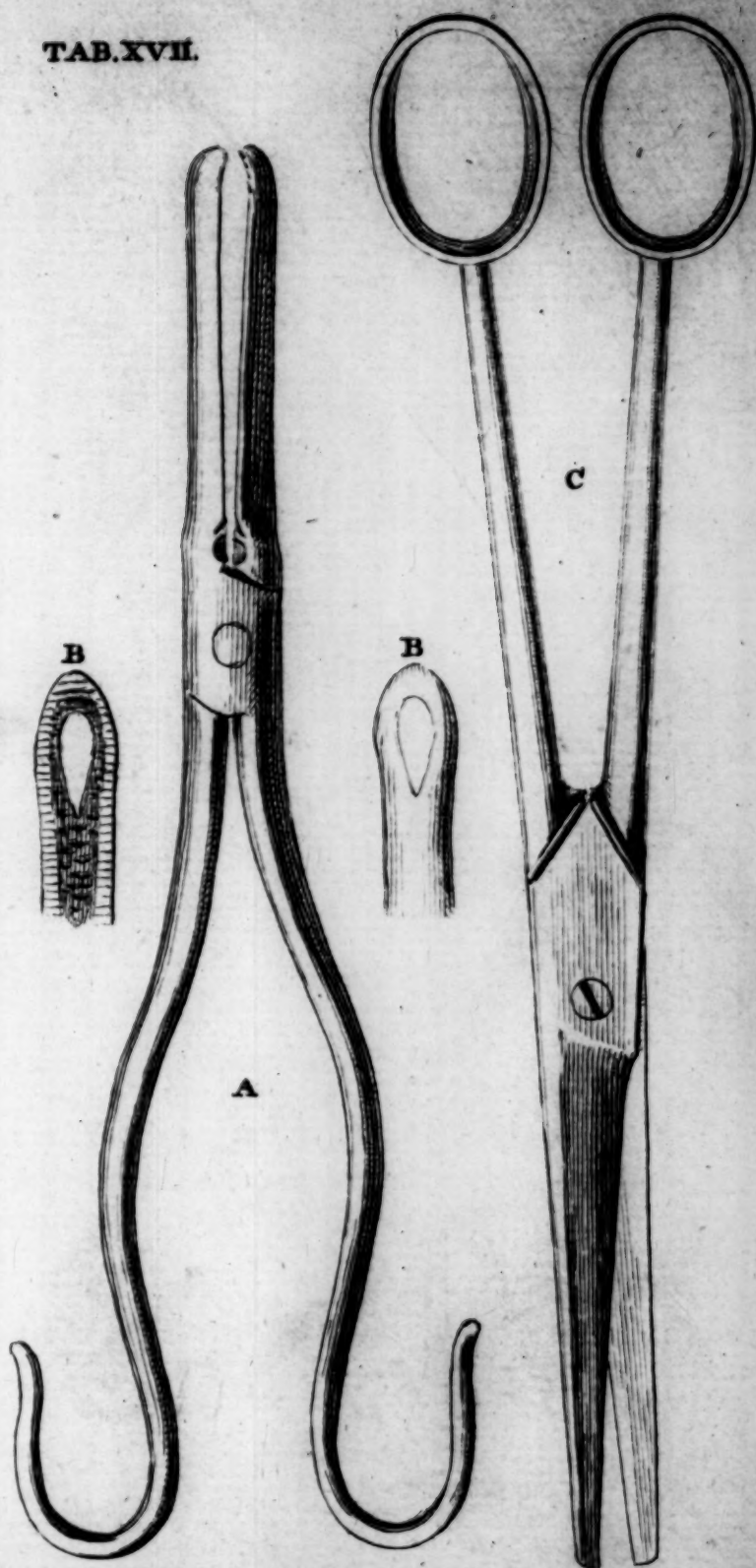
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TAB. XVII.



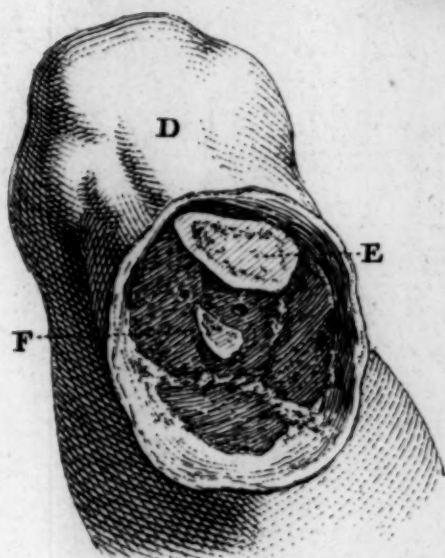
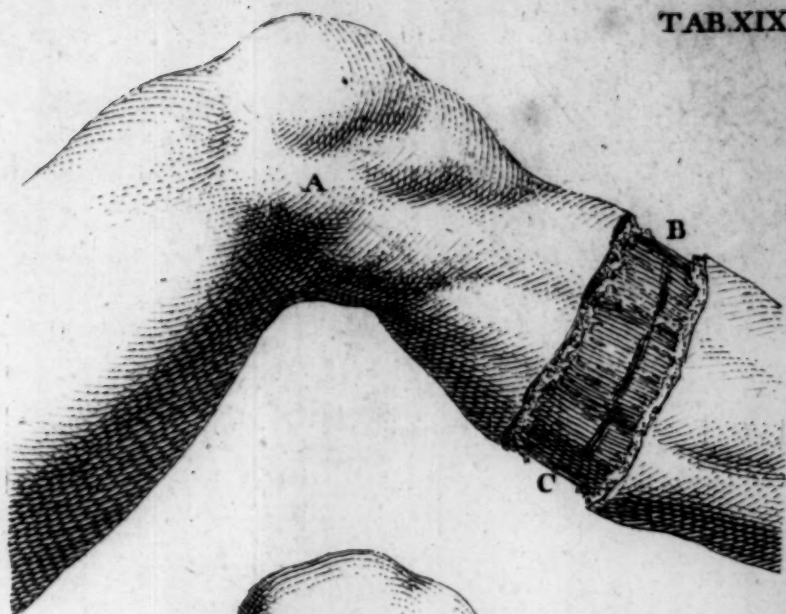
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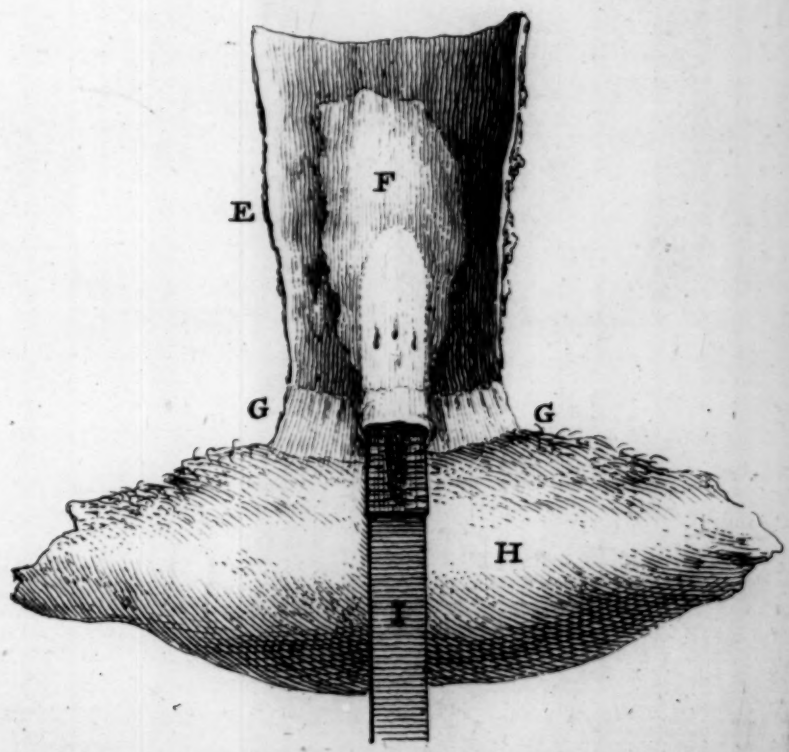
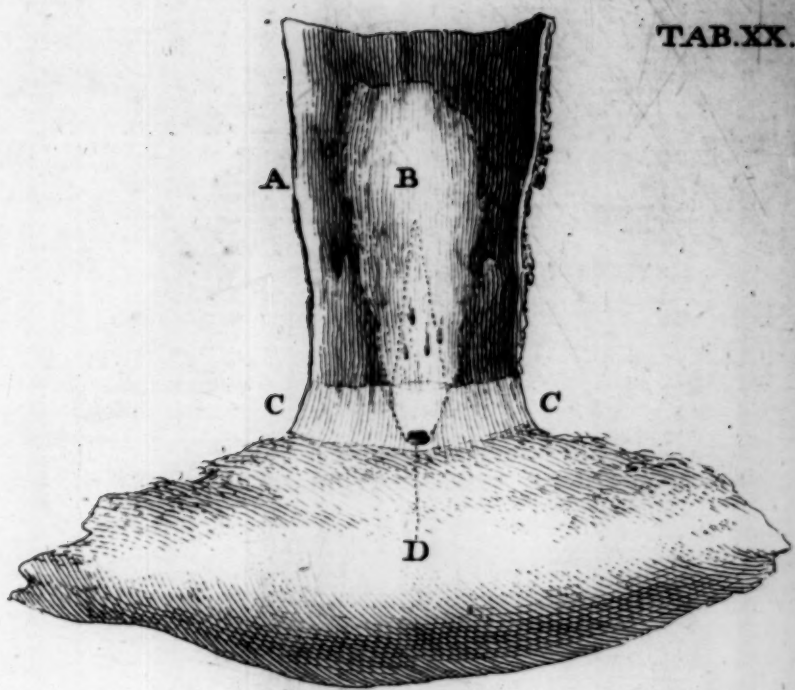
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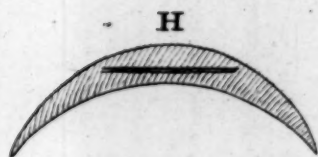
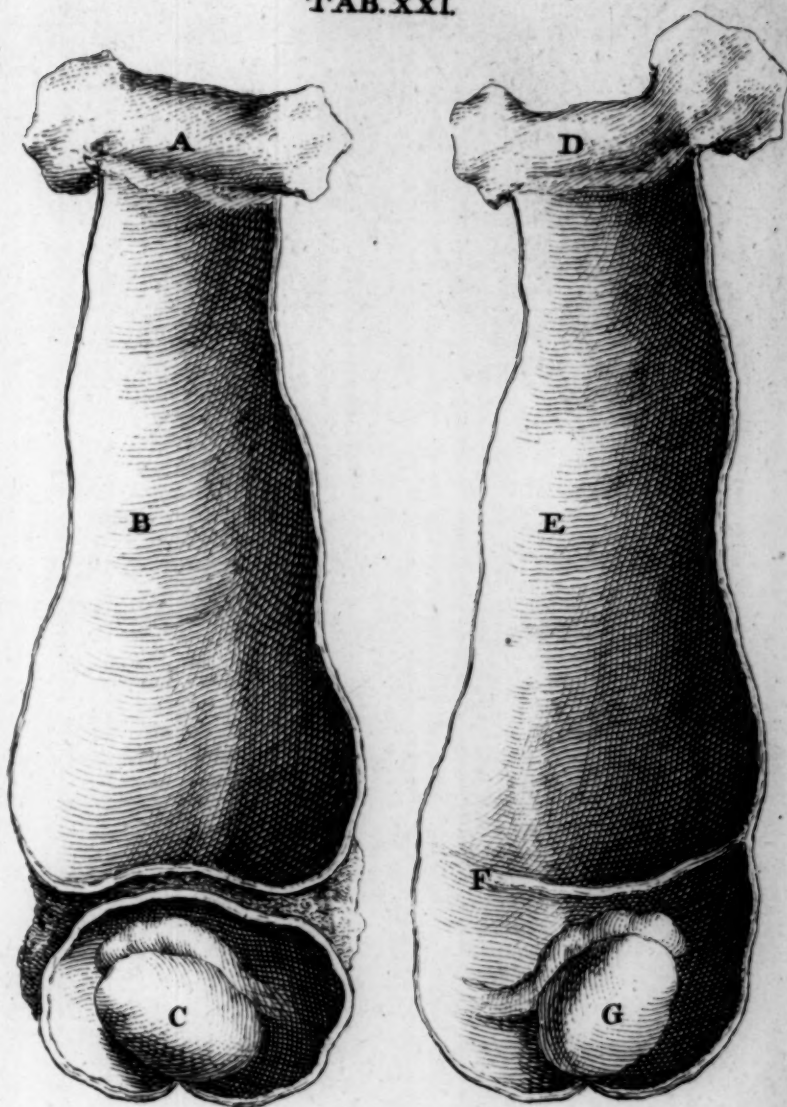
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TAB. XXI



A N
E S S A Y

Towards a New

Pharmacopœia Chirurgica.

THE surgery medicines in the public pharmacopœia (which has been chiefly collected from surgery writers) being for the most part compounded of too many ingredients, some of which are not to be had genuine, some spoiling the consistence of the medicine, and some of very little efficacy; I have therefore contrived one for my own use, in which, I hope, these mistakes are avoided, and which I here offer to the public.

Emp. Adhæsivum.

R *Emp. Diach. simp.* lb xii.

Pic. Burgund. ℥ vi. *M.*

This plaster is sufficiently adhesive, if the diachylon is made with good oil, as it ought to be, and without any animal fat.

Emplast. e Cortic. Querc. seu Defensivum.

R *Cortic. Quercus* lb iii. *Alumin.* ℥ iv.

Coq. in Aq. lb xx. *Colatur ad* lb xvi.

Add. Litbarg. Aur. lb x. *Ol. Olivar.* lb xx.

Pic. Burgund. ℥ iii. *M. F. E. S. A.*

H h

This

466 PHARMACOPŒIA CHIRURGICA.

This plaster is much more styptic than the Emplastrum e bolo, and of a much better consistence.

Emp. e Capfico Indico.

℞ *Capfic. Indic.* ℔ i.

Coq. in Aq. ℔ xvi. *Colat. ad* ℔ xii.

Adde Litharg. Aur. ℔ viii.

Ol. Olivar. ℔ xvi.

Pic. Burgund. ℔ iii.

Cer. Flav. ℔ ii. *M. F. E. S. A.*

This plaster is much warmer than that of Paracelsus, or the Diachylum cum Gummis.

Ung. Basil. Nigr.

℞ *Ol. Olivar.* ℔ iii. *Cer. flav.* ℔ ii.

Pic. Naval. ℔ iv. *M. F. Un. S. A.*

This is a milder digestive, and less apt to raise fungous flesh than the following :

Ung. Basil. Flav.

℞ *Ol. Olivar.* ℔ iii. *Cer. flav.* ℔ ii.

Resin. Alb. ℔ iv. *M. S. A.*

If any case wants a stronger digestive than this, it may be made by a mixture of *Ol. Terebinth.* at the time it is used. But if either *Terebinth.* or *Ol. Terebinth.* is put into this ointment long before, the Oil of the *Terebinth.* will evaporate, and leave the ointment of a bad consistence.

Unguentum vel Ceratum e Lapid. Calamin.

℞ *Ol. Olivar.* ℔ xii.

Cer. flav.

Emp. Diach. simp.

Lap. Calamin. optime levigat. ana ℔ vi.

M. F. U. S. A.

THIS

PHARMACOPŒIA CHIRURGICA. 467

THIS unguent ought never to be made with butter, because that soon grows rancid, nor does any animal fat do so well as oil; because it does not unite so well with the other ingredients; and in hot weather is apt to let the Lap. Calamin. separate, and fall upon a sore, which gives pain, it being corrosive alone, but in the composition is only desiccative; and diachylon plaster, which, when thin'd with oil, is very tacky, supports the powder, and very much mends the consistence of the ointment, without hindering the quality of it.

Emplastrum ex Euphorbio.

R *Emp. Diachyl.* lb x.

Euphorb ʒ xii.

Pic. Burgund. ʒ i. β

THE Euphorbium, after being well powdered, should be beat up to a fine paste with a little oil in a mortar, and afterwards finely levigated with a little more oil, and then to be put into the plaster. This is a most excellent supplicative plaster, better than the *Emplastrum Capficum Indicum*, and beyond all comparison better than that of Paracelsus, both in its consistence and use.

Emp. Anodynum.

R *Emp. Diachyl.* lb xiv.

Pic. Nigr. ʒ xi.

Cer. flav. lb ii.

Opium lb i. *M. f. Emplastrum.*

DISSOLVE the opium in warm water as much as is sufficient, strain it, and then make the plaster with the decoction instead of simple water. This plaster is of excellent use in old achs

468 PHARMACOPŒIA CHIRURGICA.

and pains, and for parts bruised. Mr. *Palmer*, an eminent surgeon and man-midwife at *Bath*, uses it upon the abdomen after child-birth; which, he says, rarely or never fails to cure the pains and extension of the belly, which women in that case are very subject to.

An Ointment for the Itch.

HOGS-LARD, or butter, one pound; the best brimstone finely powdered, half a pound; mix them, and apply the ointment to the legs only, keeping the stockings on afterwards. There is no need to purge the patient; for this ointment appears only by getting into the blood, which it purges in the same manner as mercurial unguent does. This medicine is not unknown; but I publish it here for the sake of the poor, among whom this distemper mostly prevails, and often spoils their constitutions.

The Peruvian Bark.

THE use of the Peruvian bark, internally given in cases of surgery, has not been long known; about thirty years since it was highly recommended as a remedy against mortifications, without distinction, and upon no better foundation (as far as I can learn) than its having succeeded in one single case: it was then tried in mortifications from old age and worn-out constitutions, without success (which cannot be wondered at), and thus it fell into discredit. I have lately seen two cases in which it has done wonders; the one, a very large foetid ulcer in the leg; the other, in an arm cut off above the elbow, where the ulcerated

PHARMACOPŒIA CHIRURGICA. 469

rated stump had never been healed, was extremely painful, and a sinus was formed from the stump under the *membrana adiposa* up to the head of the *os humeri*. The ulcers in both these cases were extremely foul, the matter fœtid, thin, and corrosive; but, upon taking the bark, the matter soon grew perfectly good, the pain ceased, the sores grew clean in a few days, and both the patients were soon after cured. These two cases were under the direction of Mr. Ranby, serjeant surgeon to his Majesty, to whom we chiefly owe the present knowledge of its great uses in surgery, and who intends to oblige the public with a treatise on that subject.

ADVER.

ADVERTISEMENT.

BEFORE the late act of parliament for making the surgeons and the barbers of *London* two separate and distinct corporations; the surgeons, who were members of the then united company, besides being subject to the power of spiritual courts, were liable to many heavy charges, amounting often to more than 100*l.* before they had served all the offices of the company. And the privileges and advantages they enjoyed being chiefly under charters granted them in different reigns, were lately found very precarious, and not able to screen them in *Westminster-hall* from several expensive offices, from which they were formerly supposed to have been exempted. But, since the obtaining the above-mentioned act, all their said privileges are confirmed by the sanction of parliament, with the addition of several new ones, *viz.*

A LIBERTY (on receiving the company's grand diploma) of practising freely in any part of the king's dominions at home and abroad.

AN exemption from the several offices of constable, scavenger, overseer of the poor, and all other parish, ward, and leet offices; and from being put into or serving upon any jury or inquest.

AND

AND the court of examiners of the company have also a power of examining the army surgeons; as well as those of the navy.

THE court of assistants of the present company of surgeons, soon after obtaining the above act (in pursuance of the powers therein granted), proceeded to frame a new set of by-laws: in doing which, they had an especial regard and attention to reducing the fees payable for admission into the company, and entirely taking away some of the expensive offices subsisting in the old company; and by that means to ease the younger members. In which they have so effectually succeeded, that a person now coming into the company is intitled to all the privileges and advantages enjoyed in the old company, together with the before-mentioned additional ones obtained by the said act, for less than one quarter of the money which it formerly cost. They likewise very considerably reduced the expences of the sea-surgeons: and, instead of the frequent examinations they were formerly obliged to submit to (however well qualified they might appear at first), the court of examiners now grant a qualification to every man to the full extent of (what they think) his merit.

THE company, in order further to extend the benefits of this act, have granted the diploma (which entitles the person receiving it to all the before-mentioned privileges) to any gentleman who lives above seven miles from *London* or *Westminster*, for half the price paid by those who reside within that distance; and have engaged them.

themselves by one of their by-laws to support and protect all their members, at the company's expence, in the full and peaceable enjoyment of all their just rights and privileges.

It must be confessed, that both anatomy and surgery flourished much later in *England* than in *France*, where all possible encouragements were given to both: while, in *London*, the governors of the two hospitals, being mostly citizens, out of a false policy, entirely refused the education of pupils in one hospital, and allowed of but nine at a time in the other. And the rulers of the barber-surgeons company at the same time contrived a by-law to prevent the knowledge of anatomy from spreading; cunningly foreseeing that the younger surgeons by that knowledge would advance too fast upon them. They made it a penalty of ten pounds to dissect a body out of the hall without their leave, which was scarce to be obtained: and if any one offended (as they called it) they were sure to be prosecuted. The improvements in anatomy and surgery, since these restraints have been removed, will sufficiently convince the world of the unsuitness of them.

F I N I S.